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SEPTEMBER, 1946

The Radio Amateurs' Journal

25¢

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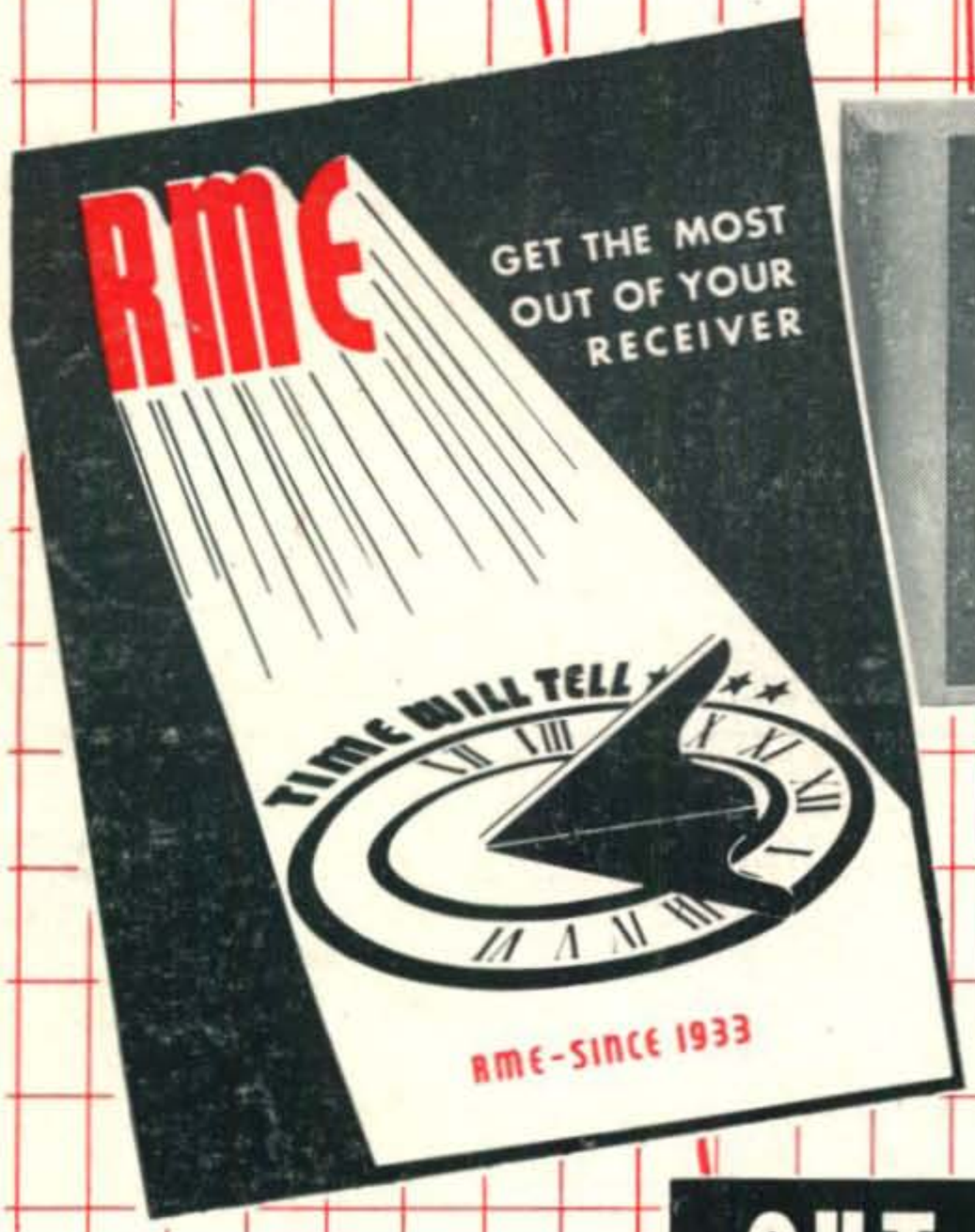

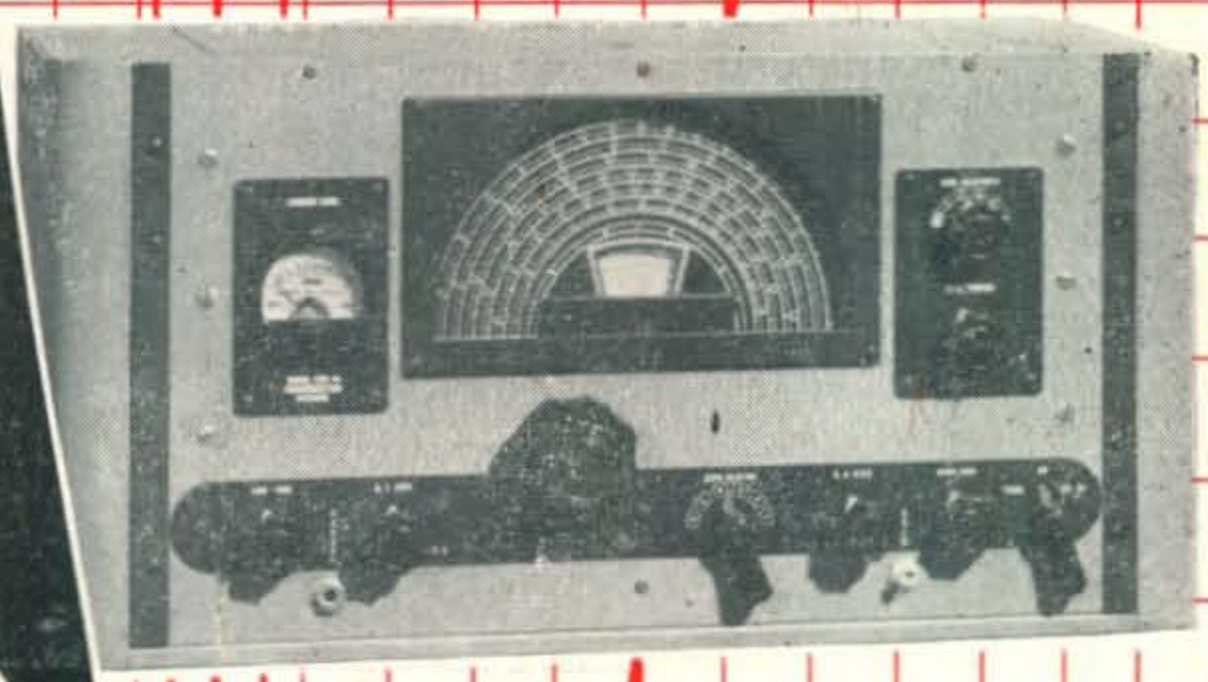

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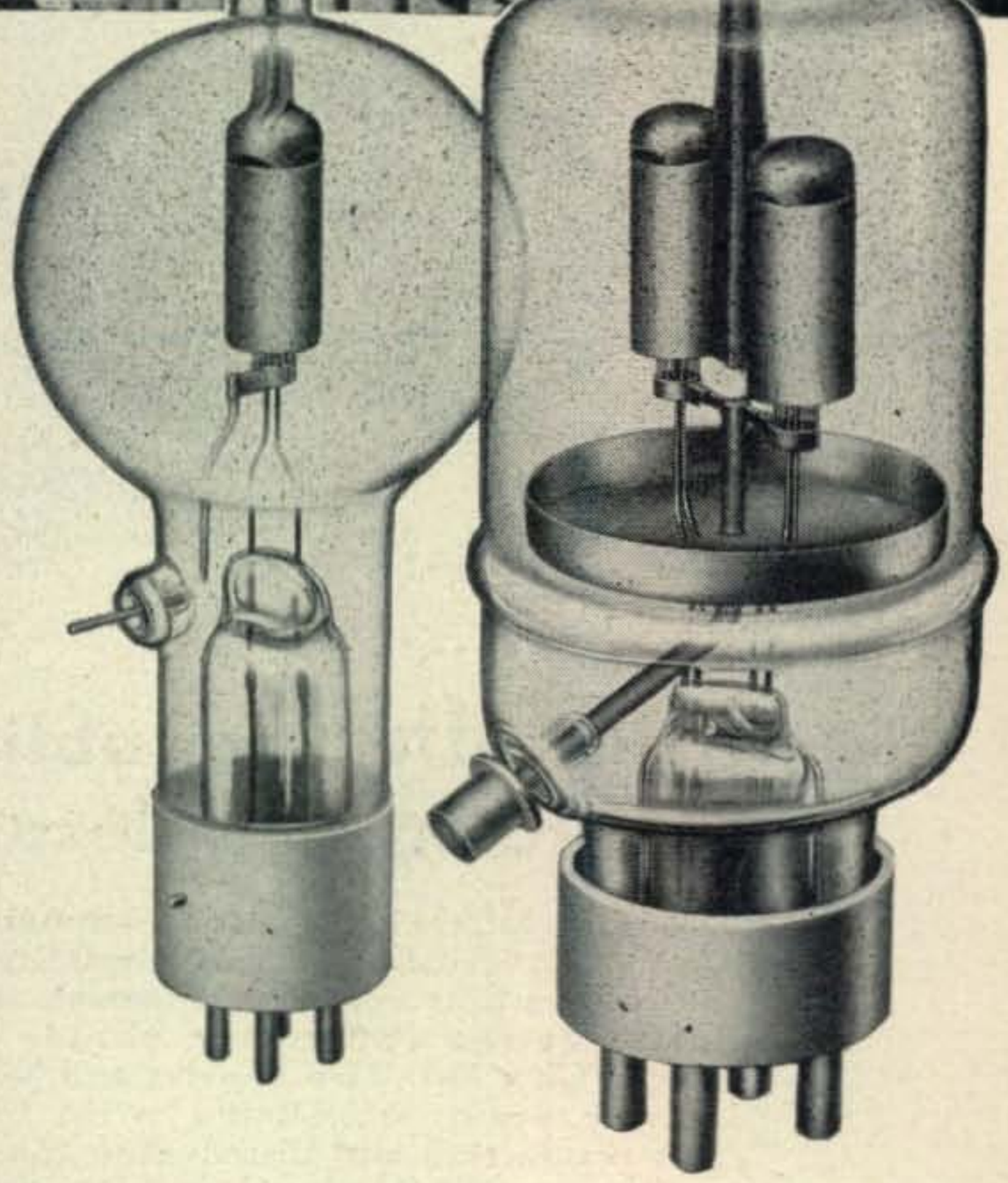

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The Hallicrafters Co., Chicago, announces the beginning of a new national network of official service centers to specialize in repair and servicing of all Hallicrafters communications equipment: marine and aviation radio, ham transmitters and receivers. Service centers have already been established at New York, Pittsburgh, Kansas City, Mo., Los Angeles and Seattle. Service at these locations will be equal in every way to that offered by the Chicago factory.

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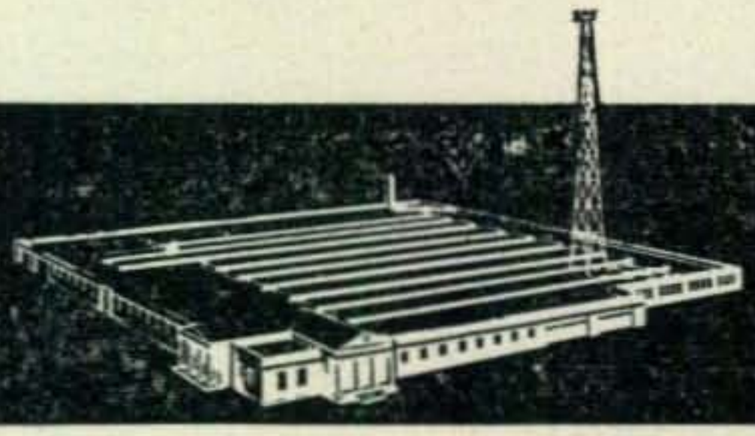

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CQ The Radio Amateurs' Journal

JOHN H. POTTS, *Editor* SANFORD R. COWAN, *Publisher*

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Vol. 2 No. 9 SEPTEMBER, 1946

COVER

W2KVY testing the Watt Squeezer I on the air. By comparison to the new RME 45 the Watt Squeezer is only a handful of equipment. Nevertheless it puts out a healthy signal in competition with many higher power locals. The old adage that you can't work 'em if you can't hear them is ample justification for a receiver considerably more elaborate than the rig. A description of the transmitter starts on page 12.

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Crystal Control

Under the exigencies of war, one particular branch of the radio industry made extraordinary advances in production methods and techniques. From an average pre-war unit production of approximately 100,000 crystal units yearly, manufacturers jumped to the astronomical output of 34,000,000 crystal units per year. Tolerances of these mass-produced crystals are often closer than the best pre-war commercial crystals. All good amateurs should take advantage of these improved (and less expensive) crystals.

When crystal control first became popular in amateur radio, it was hailed as a great boon to better signals and greater operating pleasure. Not only was frequency stability improved, but the quality of signals on the air became superior to anything known before. When it was made mandatory on 56 mc, crystal control was firmly established as the accepted method of controlling the master oscillator of the average ham transmitter.

Variable frequency oscillators, the electron-coupled oscillator, and its many variations became more popular largely because of the success enjoyed by DX and contest operators who used this method of frequency control. The ability to move closer in frequency to a DX station was a definite advantage over the fixed frequency station. Fairly high price of crystal units at the time made extensive crystal coverage of an average ham band an expensive proposition.

Unfortunately, with the v.f.o. came a number of undesirable by-products. Discourteous operators planked their v.f.o's. on top of DX—called before QSO's were completed—and in general made a nuisance of themselves. Poor line voltage regulation, minor imperfections in the rig, and major imperfections in many of the v.f.o's. became T6 signals chirping and blooping all over the band. The swish and swoop of v.f.o's. on every amateur band have become a trade-mark of a good thing gone bad.

Don't get us wrong. This is no "sour grapes" discussion. We use a v.f.o. in our own station. But we use crystals too. There is a time and a place for everything. The variable frequency oscillator is used only under certain conditions. Our line regulation is fierce. Using crystals we can run up to 500 watts with no chirp. When we make schedules using our crystal frequency, there is no question where we will be. And, as much as we hate to admit it, the temptation to do a little swishing and swooping with our v.f.o. is so great that using crystal control somewhat improves the operating quality of our station.

Personally we believe that it will be a grave mistake to discourage a far wider use of crystals than is made today. Crystal control should be as much a part of a station as the v.f.o. Stick to certain frequencies and you'll make friends more readily. Use your v.f.o. for certain type communications, for DX'ing or contest work, but use it wisely. Get in the habit of looking around for a reply *off* your own frequency. The bane of our DX bands is the misused v.f.o., encouraging crystal control and encouraging DX stations to do a bit of tuning may see happier operating days for everyone.

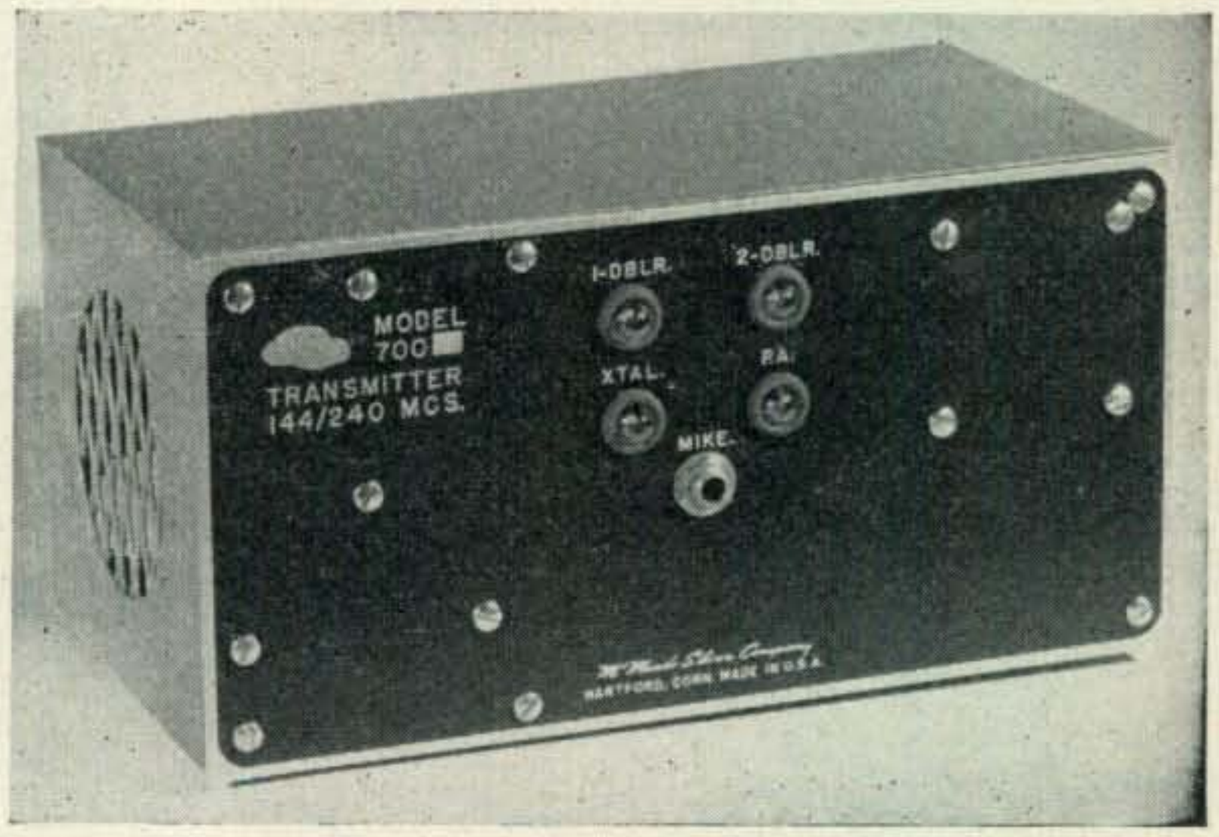
As a parting thought on the subject, let's talk about the amateur who parks a v.f.o. on the edge of the band, dead-beating with the station who occupies the last division on his dial. There are very few v.f.o's. that can perform this trick with the stability of a good crystal—the result is numerous pink tickets for amateurs who should know better. Take a look at the specifications of what is, in effect, the most de luxe v.f.o. available to the radio engineer—the General Radio 616-D heterodyne frequency meter, costing in the neighborhood of $600. Although it is completely temperature-controlled and incorporates voltage regulation, a special variable condenser with the worm cut directly on the shaft, specially aged coils, as well as extraordinary rigid mechanical construction, it is only claimed by General Radio to be accurate $\pm .1\%$ of the calibrated chart data which is individually drawn up for each meter. Of course, with the use of a crystal calibrator, this unit is as accurate as the accuracy of the crystal calibrator. If the amateur followed the practice of using a crystal calibrator in conjunction with his v.f.o., the frequency accuracy will be improved many fold. This marker crystal would not have to be any specific frequency, any crystal of a specific frequency (preferably a low drift one) would do the job. With the simple addition of a small trimmer condenser across the v.f.o. tank it would be possible to always return the v-f-o to its preliminary calibration.

Good operating techniques should be built around both types of frequency control—crystal and v.f.o.

SILVER *Announces-*

MODEL 800 144-148 and 235-240 mcs. U.H.F. receiver. Edward P. Tilton's Feb. 1946 QST design modified to Byron Goodman's *inductive* r.f. tuning, built-in PM speaker, 88″ band-spread, all in new "ATOM-X" construction. Factory built or kit for easy home construction, compact.

MODEL 700 xtal controlled transmitter. 144-148 and 235-240 mcs. 6AQ5 Tritet drives 6C4 doubler, 6C4 doubler/tripler, 832 longline push-pull final. Built-in 14 watt 6AQ5 push-pull voice modulator. New "ATOM-X" construction, size only 5″ x 10″ x 5¼″. Matches MODEL 800. Makes serious home-station or mobile rig. Factory built or kit.



Illustrated and high spotted above are but two of many fresh, *post-war* receivers, transmitters, factory built or kits and parts designed by and for serious amateurs. Prices are as low as quality is high. A penny post-card will bring you catalog of what's new . . . your favorite jobber will have them soon.

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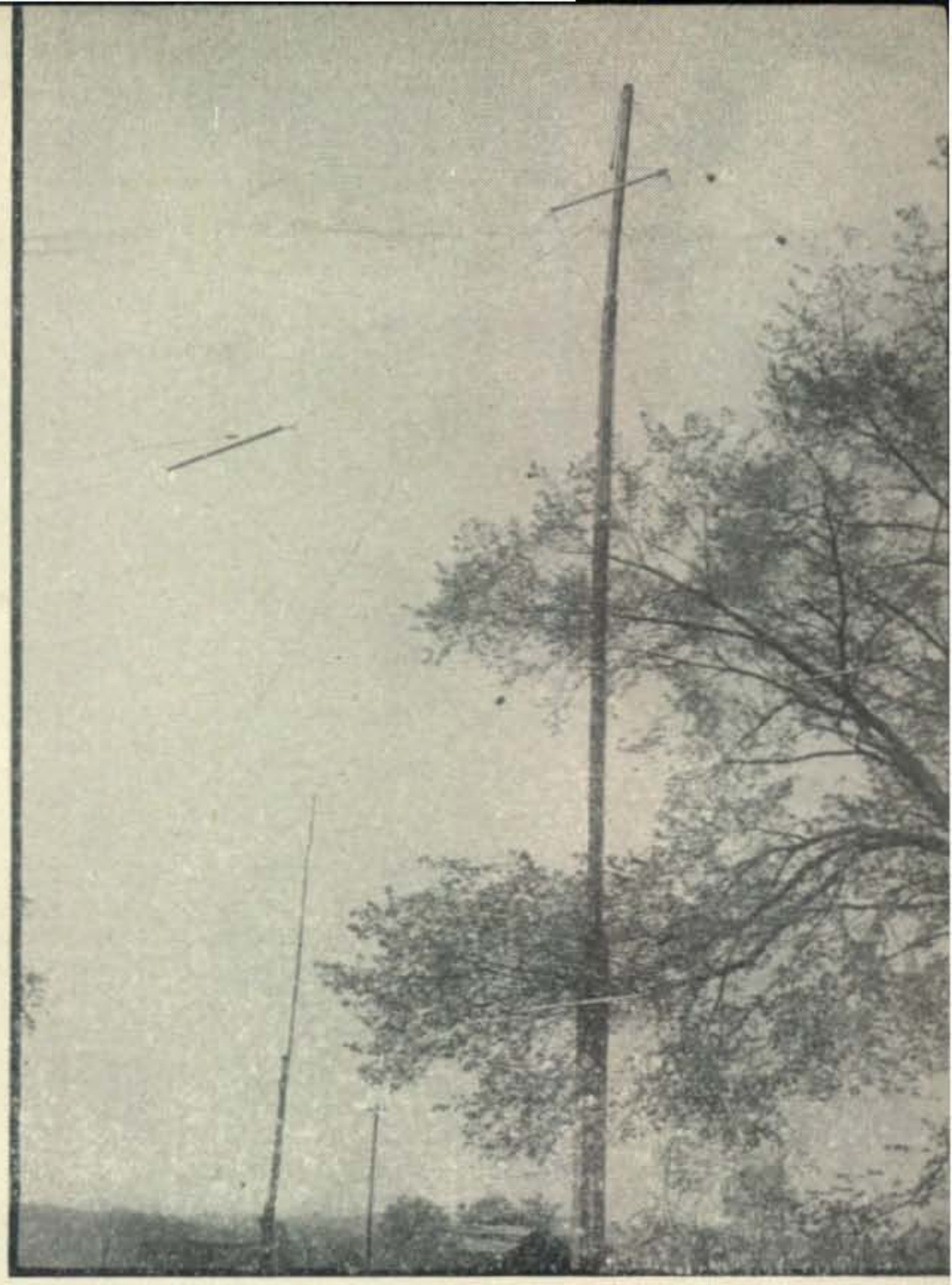
Antenna wire doesn't photograph too well, but this shot will give you an idea of the physical layout for W8BKP's Bi-Square.



THE BI-SQUARE BEAM

. . . or Working the World on 90 Watts

GEORGE W. MORROW, W8BKP*

Anyone who has worked 77 countries since the war must have something special at his shack. W8BKP modestly gives the credit to his Bi-Square beam. In this article he shares his secret with all who are interested.

ANTENNAS being the most talked of subject in amateur radio today, this simple beam and an additional element which may be added to give improved results is of interest to every DX minded ham. The radiator alone will perform well, and by adding the parasitic element the results are really "hot."

The single element or Bi-Square is a horizontally polarized radiator concentrating most of its radiation at low useful vertical angles. The radiation is bi-directional, at right angles to the plane of the wires in the radiator and, while not too directional horizontally, the nulls are very noticeable (off the ends). The horizontal polarization of this antenna results in a minimum of noise and a maximum of signal pickup on reception, and high ground reflection efficiency when transmitting.

Theoretically, the radiation resistance of an antenna is unimportant from the standpoint of efficiency, so long as it is a sizable percentage of the total resistance. The high voltages encountered when the radiation resistance is low complicate the insulation problem. The chief advantage of a high radiation resistance is that the antenna is not so critical as to frequency. This means the antenna is not critical in adjustment and can be used with equal effectiveness over the present 28 mc amateur band, both for transmitting or receiving. Because the Bi-Square has a high radiation resistance (higher than the average doublet), ordinary inexpensive insulators may be used for suspending the radiators. It also means it is easy to tune up and get going, and on reception one part of the band will not be "hotter" than another.

Construction

The supporting pole need not be of particu-

*Box 101, Washingtonville, Ohio

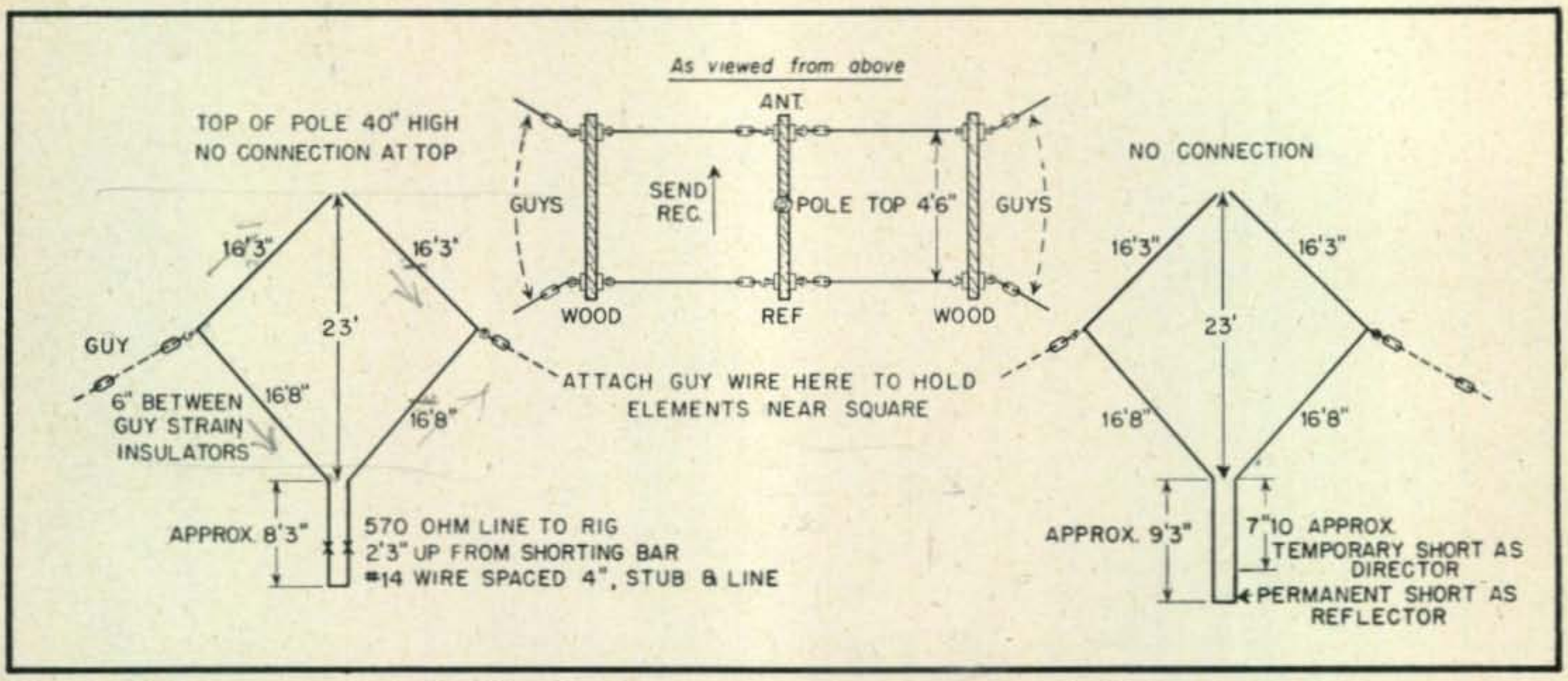


Fig. 1. Bi-Square radiator (left). Wire lengths as given in text are not critical. High radiation resistance remains relatively stable in wet weather. Radiation is at right angles to plane of wires. Parasitic element (right) is mounted on wood spreaders with no direct connection to Bi-Square. Addition of radiator lowers vertical angle of radiation and increases gain.

larly large cross section since there is little strain or pull upon it. A 40-foot pole constructed of 2″ x 3″ has been used here, but surrounding trees or buildings may be such as to require greater height to get the radiator in the clear.

Because neither the current nor voltage reach a high value the loss in the wood pole is negligible; the pole is not in a strong field.

The radiator elements are laid out as in *Fig. 1*. The top legs of each radiator should be exactly 16′3″ long and the bottom legs 16′8″ for optimum performance from 28 to 28.5 mc. The insulators for the bottom legs attach 23′ down from the top of the pole or from the point where the top legs attach to the pole 'if not the top'. Each radiator is insulated with an ordinary 3″ glass insulator at the top and bottom where attached to pole. At each corner of the radiators there is attached a guy wire insulator. A long guy wire from this point to the guy anchor point is used to guy the array. If the length of each radiator is equal and they are attached to the pole as described, when the guys are pulled tight the result is a near perfect square. It is necessary for proper operation of the radiator that the legs of the radiator form a near perfect square.

The transmission line may use anything from 2 to 6 inch spacing although 4″ spacing is recommended since the radiation from such a line is less than from a 6″ spaced line. It is not so critical that slight variations in spacing will have a noticeable effect on the surge impedance. A ten foot length of line, approximately a quarter-wave stub, is cut and attached to the radiator and this line is used to tune the array to resonance.

Tuning the Beam

As a resonance indicator a 6.3 volt dial lamp with 2″ leads and clips soldered to it or a low range r-f meter can be used. In our case we used the dial lamp.

The transmission line is inductively coupled to the final amplifier. At the radiator end of this line we attach a make-shift doublet, which is under the Bi-Square radiator, a few inches off the ground. Power is now fed to this makeshift antenna and our dial lamp resonance indicator is slid up and down the stub to locate the point at which to attach a shorting bar. This resonance point is not sharp and is indicated by maximum brilliance of the lamp; this is usually about 8′6″ down the stub from the radiator.

The resonance indicator is removed and replaced by a heavy, well-soldered shorting bar at the resonant point. This point is zero voltage and the center of the shorting bar may be grounded for lightning protection.

The next step is to find the proper point to attach the feed line to the stub. As a starting point attach the feed line to the stub about 2′6″ up from the shorting bar and then measure the standing waves on the feed line. An inexpensive method is to attach 6.3 volt dial lights, shunted across 6″ of the line (on either side) spaced approximately 4′6″ between lamps. We have found three are usually sufficient. These should not be attached close to the stub, since there is a field around it that may cause one of these lamps to glow with greater brilliance due to inductive pickup from the stub.

FREQ. (MC)	METER: Single Bi-square	METER: Bi-square + Reflector
28.0	S-5	S-9+ 6db
28.15	S-5	S-9+20db
28.3	S-5.5	S-9+36db
28.45	S-5	S-9+10db
28.6	S-4.8	S-9+10db
28.75	S-5.2	S-9+ 5db

Fig. 3. Field strength readings taken on Bi-Square with and without reflector.

The feed line is now slid up and down from the first point of attachment until a point is found at which the brilliance of each of the three lamps is equal. It is *not* necessary that the standing waves be *completely* eliminated from the line; the line will operate with very low losses even though there is a slight variation in current and voltage. Another method would be to check the voltage and current excursions along the line with an r-f galvanometer or low range milliammeter and rectifier connected to a pickup coil.

These detailed instructions are intended for the amateur who is not satisfied unless he is certain his radiator is operating at peak performance. Actually the adjustments are not critical and good results can be obtained by merely cutting the radiators and stub to the dimensions given and letting it go at that. By actual tests this radiator is at least as good as the Lazy H, one of the best 28 mc arrays, and covers a greater horizontal path. It will out-perform most simpler 28 mc arrays and compare quite favorably with the more elaborate ones, without going to the trouble to get everything right "on the nose."

You may wish to cover a greater area than permitted with a single Bi-Square. This can be done easily by building an exact duplicate of the one described above and placing it at right angles. Arrange an r-f relay to switch the transmission line from one stub to another and you are all set to cover the globe in great style. There will be no coupling between radiators so long as they are exactly alike and at exact right angles to each other, even though both are mounted on the same pole.

Adding a Reflector

Our next step in search for greater antenna gain was to build a duplicate to the single Bi-Square described above and mount these two on one pole parallel to each other across-connected and

[*Continued on page 60*]

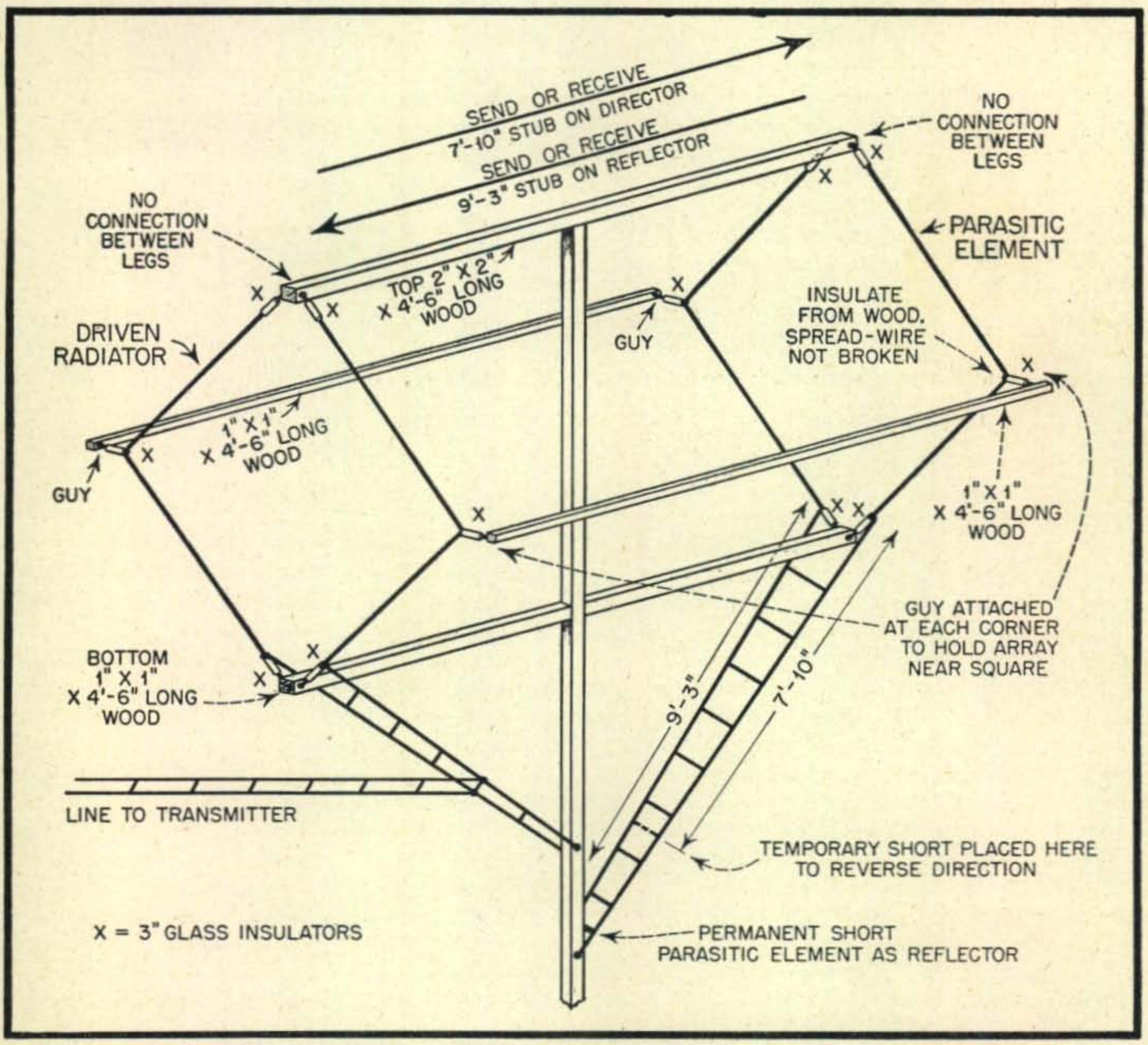

SEND OR RECEIVE
7'-10" STUB ON DIRECTOR
SEND OR RECEIVE
9'-3" STUB ON REFLECTOR
NO CONNECTION BETWEEN LEGS
PARASITIC ELEMENT
NO CONNECTION BETWEEN LEGS
TOP 2" X 2" X 4'-6" LONG WOOD
INSULATE FROM WOOD. SPREAD-WIRE NOT BROKEN
DRIVEN RADIATOR
GUY
1" X 1" X 4'-6" LONG WOOD
GUY
1" X 1" X 4'-6" LONG WOOD
GUY ATTACHED AT EACH CORNER TO HOLD ARRAY NEAR SQUARE
BOTTOM 1" X 1" X 4'-6" LONG WOOD
9'-3"
7'-10"
LINE TO TRANSMITTER
TEMPORARY SHORT PLACED HERE TO REVERSE DIRECTION
X = 3" GLASS INSULATORS
PERMANENT SHORT PARASITIC ELEMENT AS REFLECTOR

Fig. 2. Bi-Square beam showing method of construction and physical dimensions of reversing stub and supporting frame.

The Watt Squeezer I is a compact low power transmitter. Mechanically it is extremely simple and can be constructed with a minimum of tools. Twisted cable is metering lead, external to the rig.

THE WATT SQUEEZER I

ROBERT L. ROD, W2KVY*

An ideal beginners transmitter, this little rig incorporates all the features desired by the advanced amateur who wants an all-band low power transmitter

DISTRIBUTED THROUGHOUT the vast amateur fraternity is a rather large group of individuals who are beset with apparently insurmountable obstacles deterring almost any and all attempts to place a few watts on the air. Most of these unfortunates are cliff-dwellers residing in the larger cities, and of these not a few have direct current as the only available power source. It can also safely be surmised that at least half the metropolitan brethren are unable to erect an 80-meter half-wave antenna without it drooping at the ends or having it perched at a precarious angle with respect to the ground. Added to this misery is the constant shadow of the BCL who must be carefully considered and respected.

The rig described herein is an answer to the problem of getting on the air while living under the following conditions:

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The author's sole source of power is a rotary converter delivering 300 watts of 110-volt, a.c. Inasmuch as the power drain of the communications receiver is 179 watts, only 121 watts are available to power the entire transmitter. This minute quantity of power demands the utmost in simplicity, efficiency, and economy of tubes if a transmitter is to be utilized which might supply thirty or forty watts output.

A few score antennas owned by neighboring BCLs clutter the roof, and since the author's transmitting sky hook passes over many of them with but inches to spare, all key clicks and spurious radiations must be greatly attenuated if peace on earth and good will are to prevail.

The Watt Squeezer I is a break-in transmitter capable of pushing a fairly decent signal into the QRM with extreme economy of line input power.

A 6V6 is used as a conventional crystal oscillator which more than adequately drives a single 807 power amplifier to any input within the tube's

rating. A low-current-drain bias system is used to hold the screen voltage of the 807 at an extremely low value during portions of the time when the key is up, thus effectively limiting excess amplifier plate current flow. This expedient makes unnecessary utilizing battery or power supply bias to keep the plate current of the 807 down when excitation is off. During the time when the key is down and the transmitter is operating, the 807 screen voltage is instantly brought up to its normal operating value automatically.

A considerable amount of time was spent in perfecting the quality of the transmitter signal with emphasis being placed on key-click elimination. The particular keying method is practically clickless and has helped maintain friendly relations with the neighboring cliff-dwellers. And, if convenient, the system can be applied to other rigs, fellow hams are contemplating building.

It is worth a note that the only tools needed to build the Watt Squeezer I are a hand drill, reamer, Greenlee radio chassis punch (1-5/32"), and soldering iron. No large chassis inserts were made, nor were they attempted . . . mainly because the author had no facilities for heavy machine shop work and surmised that most amateurs are in a similar situation. Further simplification in construction is achieved by using shunt feed to both stages, thus enabling the rotors of both tuning condensers to remain at ground level.

Some of the parts incorporated into the equipment are choice surplus items now abounding at the many stores.

Notes About The Transmitter

Glancing at *Fig. 1*, it is apparent that the Watt Squeezer I is extremely straightforward aside from the method used to hold the 807 plate current within limits. The straight 6V6 crystal oscillator is absolutely conventional and performs well with its own low-voltage power supply, which offers good output regulation under keying conditions. The oscillator power supply delivers some 300 volts to the 6V6 plate, more than enough to secure sufficient drive for the 807. By using a

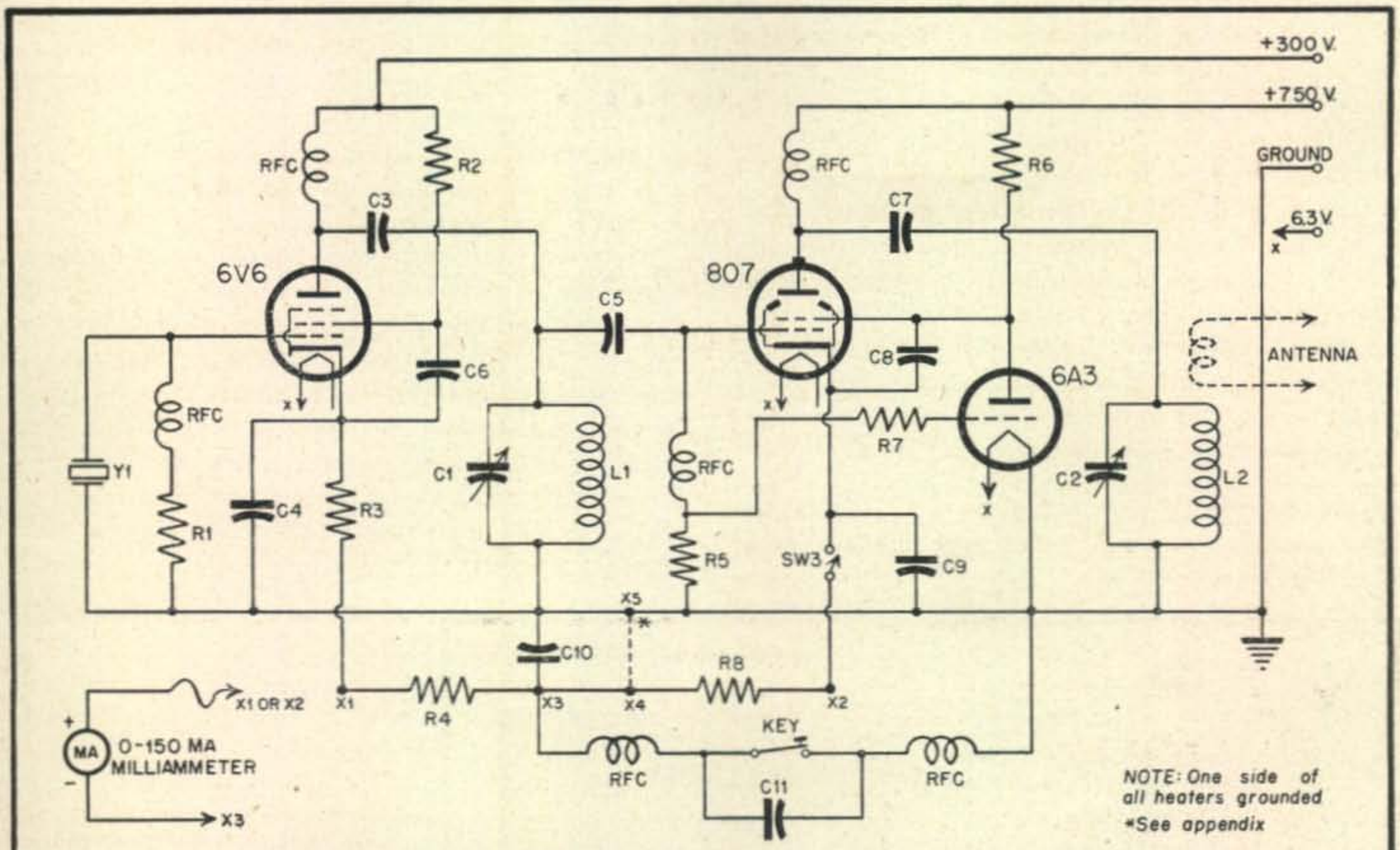


Fig. 1. Circuit diagram of the r-f end of the Watt Squeezer I.

C-1—140 μμf variable.
C-2—100 μμf variable, 1,000 volt spacing.
C-3—0.001 μf mica.
C-4, C-6, C-8, C-9—0.001 μf paper.
C-5—120 μμf mica.
C-7—0.001 μf mica, 1,000 volt working.
C-10—0.01 μf paper.
C-11—0.1 μf paper.
L-1—3.5 mc, 23 turns No. 20 plain enamel, spaced the wire diameter on 1½" dia. form.
L-2—3.5 mc: 32 turns No. 22, spaced the wire diameter, self-supporting, 1½" dia. Link optional.
RFC—2.5 mh, 125 ma choke.
R-1—10 K, 1 watt.
R-2—15 K, 2 watt.
R-3—200 ohm, 1 watt.
R-4, R-8—20 ohm, ½ watt.
R-5—15K, 1 watt.
R-6—See text.
R-7—100 K, 1 watt.
S-3—SPST toggle switch.
Y-1—80 meter crystal.

separate power supply for the oscillator, one finds that the keying is cleaner and less apt to chirp. Furthermore, less power is wasted by using a small low voltage supply than is wasted in dropping resistors when a high voltage supply is tapped off for a few hundred volts to power the oscillator.

A further inspection of the circuit diagram will show that the oscillator output is impressed across the 807 grid through the coupling condenser *C-5*, while the d-c 807 grid voltage is applied to the grid of a 6A3. The 6A3 plate is tied to the screen of the 807, which in turn is tied to B+ through resistor *R-6*. When the 807 is not being excited, either due to the key being up or the oscillator being detuned or wholly inoperative, the 6A3 is conducting heavily in the zero-bias condition. Therefore the voltage at the plate of the 6A3 (and of course the voltage at the 807 screen) drops to an extremely low value by virtue of the IR drop through its plate load resistance *R-6*. When the key is down and the oscillator is operative the large negative voltage developed across *R-5* practically cuts off all plate current flow through the 6A3, allowing the 807 screen voltage to rise to a value determined by the resistance of *R-6*. Under this condition, the 6A3 looks like an open circuit, and the normal screen current of the 807 produces an IR drop through *R-6* which, when subtracted from the value of the + high voltage, equals the desired screen voltage. Since it is important to make certain that the 807 screen voltage is always situated somewhere between 250 and 300 volts in order to achieve maximum tube efficiency, the accompanying table lists the value for *R-6* which will set the 807 screen voltage at +250 volts with the key down when one of four high voltage potentials are available:[1]

D-C Plate Voltage	R-6	
400 volts	20,000 ohms	(20 watt)
500 "	42,000 "	(20 watt)
600 "	50,000 "	(20 watt)
750 "	85,000 "	(20 watt)

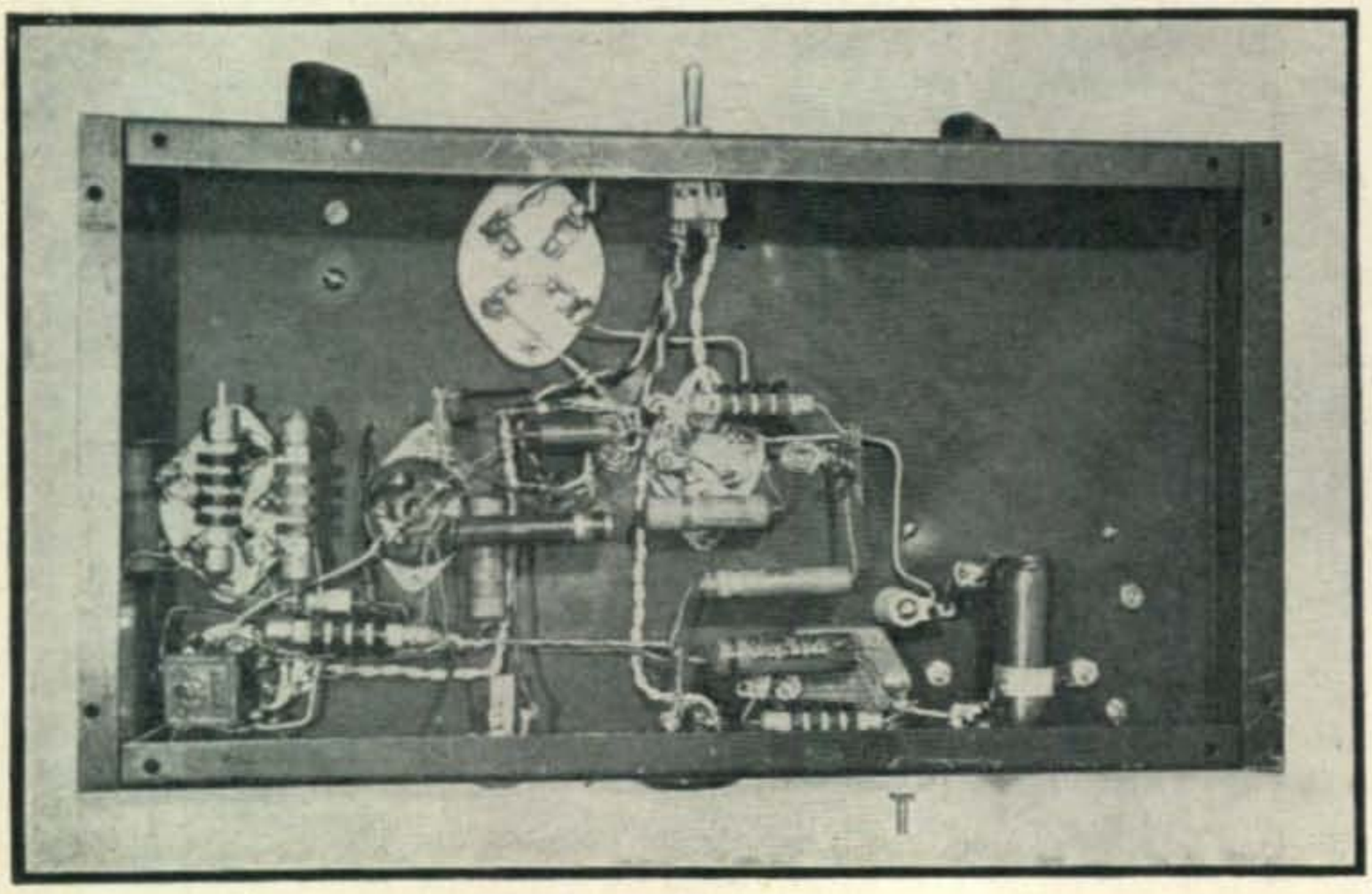
When the key is up and the 807 is cut off, the 6A3 plate current flow tends to add a measure of voltage regulation to the rig by drawing a rather large amount of current from the high voltage supply. A 2A3 or a 6V6, 6L6, or 7C5 (the latter strapped as triodes by tieing plate and screen terminals together) may be substituted for the 6A3 without disturbing the operation in any way. In fact, any low plate resistance tube not having a remote cut-off can be used.

The oscillator tank coil is wound on a 6 prong plug-in form, while the amplifier uses a commercial coil of the 75 watt variety, which in this case had ten turns removed in order to tune with the particular condenser, *C-2*, available. Depending upon requirements, any antenna coupling circuit can be used.

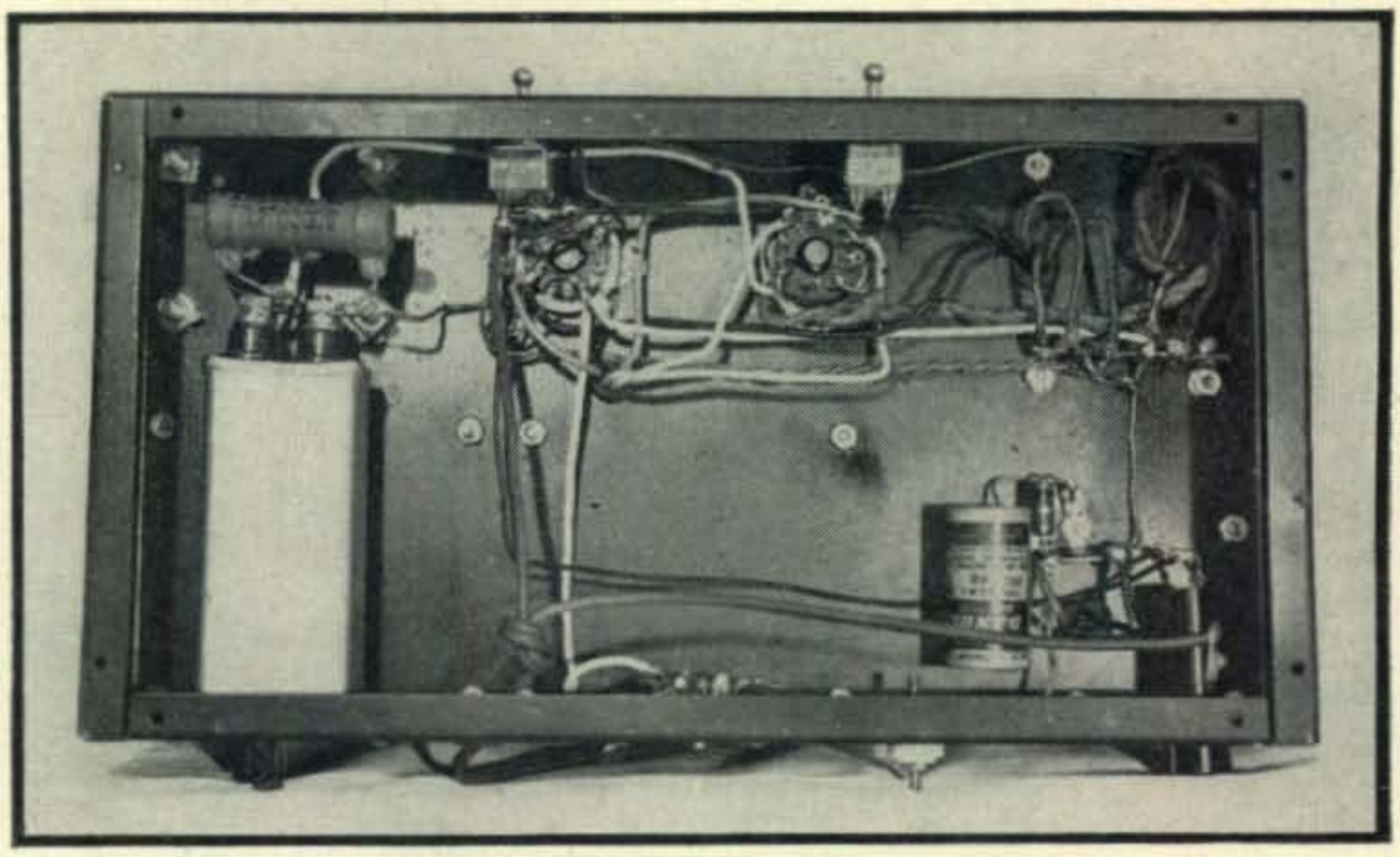
The oscillator is keyed in its cathode circuit, and the filter network shown in the diagram is used to minimize key clicks. The 0.1 μf condenser across the key contacts "softens" the note and aids in making break-in operation more restful to the operator.

Metering is accomplished by placing a milliammeter across either of two 20-ohm resistances, one being inserted in series with the cathode circuit of each of the two stages. Although this type of metering does not give the absolute value of plate current due to the inclusion of screen and grid currents in any particular reading, it does offer an additive feature of safety as compared to plate current metering. A SPDT switch (not illustrated) enables one meter to be used for

[1]Values for *R-6* vs. plate voltage are listed to allow for changes in power supply design by the individual amateur.



Under chassis view of r-f section. Placement of parts should be carefully duplicated. The socket in the front is for the 6A3. From left to right, the center row sockets are the 807, 6L6 plate coil, crystal socket. Behind the crystal socket is the 6L6 socket.



Power supply wiring is relatively simple and may vary considerably depending upon components used. The important consideration is to have the proper output voltages. Care should be observed whenever the supply is operating. Voltages are high enough to be dangerous.

reading either the oscillator or the amplifier cathode current.[2]

Power Supply

Whereas the transmitter of the Watt Squeezer I is rather conventional, the power supply departs from the beaten path to utilize a few kinks to supply the voltages in spite of an acute transformer shortage. Since few manufacturers produce a plate transformer rated at eight or nine hundred volts either side of center tap at 100 ma, and since it was deemed unwise to invest in a higher current transformer merely to power a single 807, two identical low voltage 100-ma surplus transformers were pressed into use. These transformers are connected with their primaries in parallel and the secondaries, which are rated at 460-0-460 volts, in series. No use is made of the filament windings also incorporated into the units. A correct "aiding" series connection must be made on the secondary side if the output voltages are not to buck each other yielding zero volts output by virtue of vector subtraction. Likewise the primaries must be correctly connected in parallel, and a voltmeter will remove any doubts which might prevail. The combination produces approximately 920 volts no-load, when correctly wired, leading to the choice of a superb new high-vacuum rectifier, the 5R4GY, as the 807 power supply rectifier. The 5R4GY filament draws but 2 amperes at 5 volts, and the tube itself, being high vacuum, is absolutely free from hash usually associated with older mercury-vapor tubes needed to handle this voltage.

A 10 henry, 200-ma choke and an oil-filled 2 μf 1000-volt condenser form the high voltage filter system with a bleeder included to load down the supply when no load is being drawn from the unit.

Small receiver type components are used exclusively for the oscillator power supply. Here again an economy in power is realized by using the 6X5 full-wave rectifier tube with its low current 6.3 volt heater. *T-1*, in addition to supplying the oscillator plate voltage, supplies heater power for all tubes and filament voltage for the 5R4GY.

The common a-c input is fused for safety, and a bleeder is placed across the low-voltage supply output in keeping with safe practice.

Mechanical Details

Both chassis are identical in size, 7″ x 13″ x 2″ A rubber-covered four conductor cable interconnects the two units except for the 807 high-voltage feed which is brought from the power supply to the transmitter by feed-through insulators at either end.

The particular layout shown is not in the least critical, and no parasitic oscillations have been detected. Aside from the half shield placed around the 807 (Millen 80007), no special pains have been taken to isolate the two stages other than placement of the parts as shown. The d-c blocking condenser, *C-7*, is mounted on two feed-through bushings, one end of which serves as a feed through insulator to bring the high-voltage up to the 807 plate cap and the other end serving a similar function in bringing the stator lead of *C-2* back to the 807 plate through *C-7*.

Plastic-covered stranded hook-up wire is exclusively used for all wiring with the result that a commercial appearance is produced with a minimum of effort. This type of wire strips easily, is readily bent into sharp angles, and is pleasingly color-coded. For ease in trouble shooting, standard color designations are used throughout. Red indicates high voltage, green identifies grid circuit wiring, black represents ground, brown filaments, etc.

A common ground, consisting of a piece of #14 solid wire, runs through the transmitter chassis to

[2]Important—See Appendix

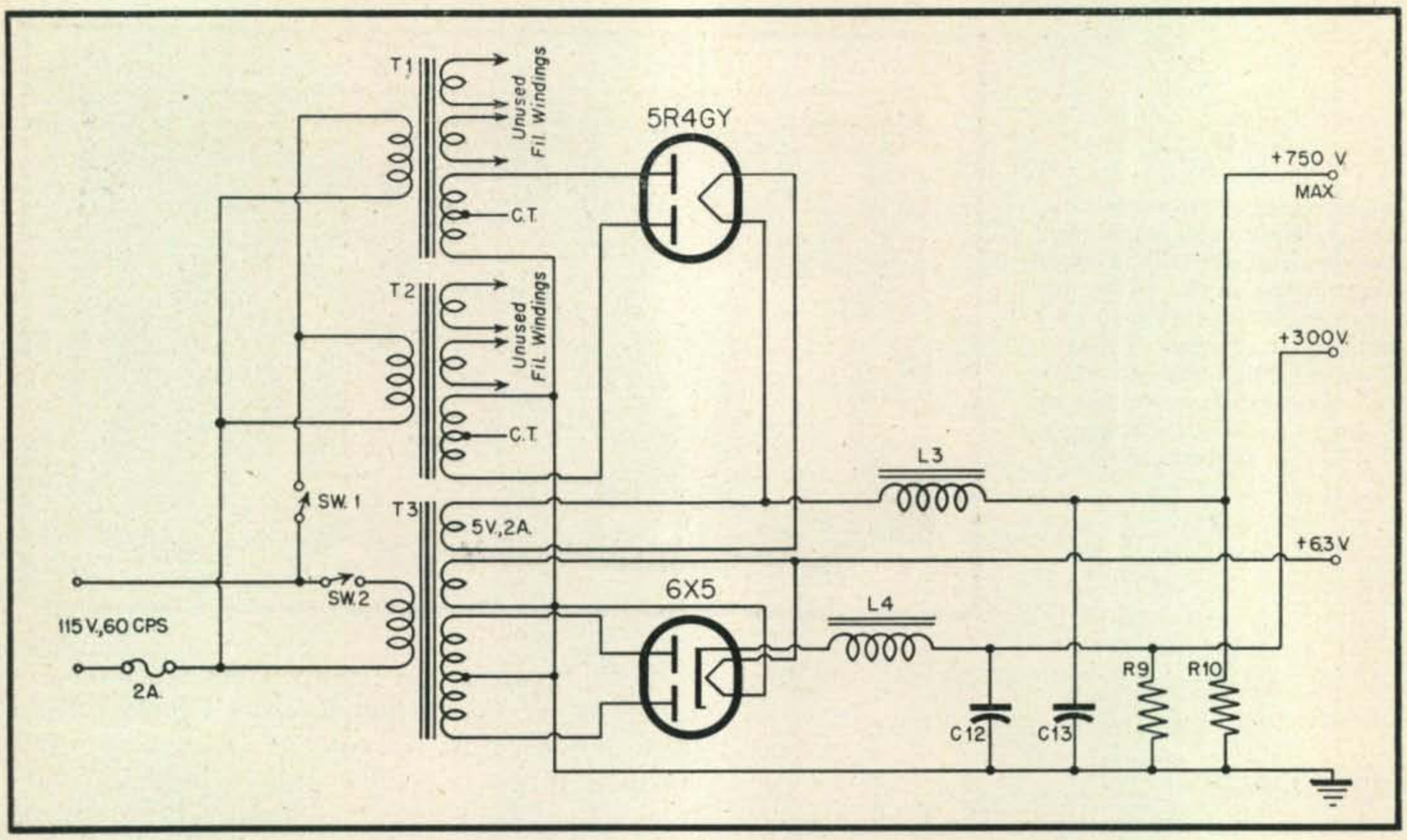


Fig. 2. Watt Squeezer I, Power Supply

T-1, T-2—Power transformers (See text) One plate transformer, rated between 600 and 900 volts either side of CT at over 100 ma, may be substituted for these two transformers depending upon the builder's requirements.
T-3—Power transformer, 700 volts CT at 70 ma, 5 volts at 3 amps 6.3 volts at 3 amps, (Stancor P-4078).
C-12—8 μf, 450 d.c. working volts.
C-13—2 μf, 1,000 d. c. working volts, oil-filled.
L-3—Filter choke, 10 henries, 200 ma
L-4—Filter choke, 15 henries, 80 ma (Stancor C-1420)
R-9—100 K, 2 watt.
R-10—80 K, 20 watt.
S-1, S-2—SPST toggle switches.

[*Equivalent parts may be substituted*]

insure that ground connections are good and solid. The 807 screen-grid bypass condenser is placed across the socket in the shortest path to the cathode pin in order to minimize parasitic oscillations. With this precaution, no spurious oscillations should develop. If any do appear they can probably be eliminated by inserting a 50 ohm resistor in series with the input to the 807 grid as close to the actual grid prong as is possible and another at the screen grid prong.

Extra unused prongs on the socket of *L-1* and the 6V6 are used to support wiring and small components, and all leads are kept as short as possible. The key jack is mounted on the rear of the transmitter chassis, and an extra control over the 807, a cathode switch, is placed on the front wall of this same unit. The extra switch is a convenient way of de-energizing the 807 without removing its plate voltage by the power supply HV switch.

Tuning-Up

Since the coils used in the transmitter need no special taps and since they are not at all critical, tuning-up should be a simple matter provided that no errors exist in wiring and that all components have been reasonably selected to agree with the specified values given in the schematic. After ascertaining that the voltages throughout the circuit are of the right order (if a suitable d-c voltmeter is available), the oscillator can be checked for operation (with the 807 plate voltage left off) by inserting a crystal in its socket and turning the low-voltage supply on. Rotate condenser *C-1* until the measured oscillator cathode current dips from an off-resonance value of about 50 ma to approximately 20 ma. For stable operation, *C-1* is next adjusted for slightly less capacity than that needed to minimize the oscillator cathode current at its lowest reading. At this latter point, the 6V6 cathode current will be slightly higher than that observed at the "peak" of the dip. A one-watt neon bulb placed near *C-1* will glow at this point if the above operation has been correctly performed, and a check on the quality of the note under keying can be made on the station receiver. If the keying tends to drag, decrease the capacity of *C-1* slightly, and if this measure does not clean up the keying, the crystal should be given a cleaning in carbon tet.

The final amplifier can be tuned by adjusting *C-2* for a minimum value of 807 cathode current with the key down, the oscillator operative, and

[*Continued on page 59*]

Notes on The 10 Meter Vertical

OLIVER P. FERRELL*

IT IS A VERY common practice for the new Ham, and some oldtimers as well, to try to get out on 10 meters with a vertical half-wave antenna. At first glance, the vertical appears to have several advantages. It is very simple to erect, since the length need not be over 17 feet, it can be made to radiate equally well in all directions or azimuths and is fairly easy to tune.

After erecting the vertical at some random height, most amateurs find it works out pretty well on the ground wave—a few find it works on some "short-skip," but not on the DX. Some find it works erratically on DX and on short-skip, while unfortunately, many find it very poor on both. Since the rest of the locals appear to work the DX with other types of antennas the vertical becomes a worthless hunk of wire. However, 9 chances out of 10, it isn't the vertical itself that is totally at fault, but is probably due to the Ham, who neglected to give a little more thought to some simple applications of the "angle of radiation."

Angle of Radiation

The angle of radiation is not a mystic quantity, determined experimentally by trial and error. It is a finite relationship of ionospheric wave propagation and great circle distances. On the 10 and 11 meter bands this relationship is exceedingly elementary and should be fully understood beforehand by anyone attempting to use these two bands.

On occasions of 10 and 11 meter short-skip it has been possible to fully establish two factors. They are: (1) the short-skip is caused by an abnormal E layer condition, where the reflecting medium is almost invariably 110 km in height. (2) most of the contacts are made between the ranges of 300 to 900 miles. A few single hop contacts have been made out to as far as 1400 miles, but generally working beyond 900 miles calls for an antenna that is fairly well in the clear and the use of power measured up in the hundreds of watts. From these two parameters it is possible to determine quite accurately the minimum and maximum angles of radiation.

The minimum working angle of radiation for working out on short-skip could be considered in the terms of an arc several minutes above the horizon. But, with the power output employed by the amateur, few stations can claim a working minimum angle of 3 degrees, while the general run is about 4 to 5 degrees. At angles below 3 degrees the ground scatter and absorption become important attenuating factors which normally do not interfere with higher angles of radiation.

For an angle of radiation of 5.5 degrees, which is equivalent to a range of 900 miles, or the distance between New York City and St. Louis, we find approximately 40% of all short-skip contacts. During an intense sporadic E burst, 10 meters has been known to open from 300 miles. This range will determine the maximum angle of radiation and is equal to exactly 24 degrees for a 110 km layer height. Therefore, any type of antenna that radiates above 24 degrees to any appreciable amount is, to follow the classic expression, a "cloud-warmer."

Any Ham who managed to get a crack at radar sitting during the war is probably familiar with the number of lobes of vertical radiation as the height of any antenna is increased. The vertical half-wave is particularly notorious at this practice of radiating a considerable portion of its energy at extraneous and sometimes worth-

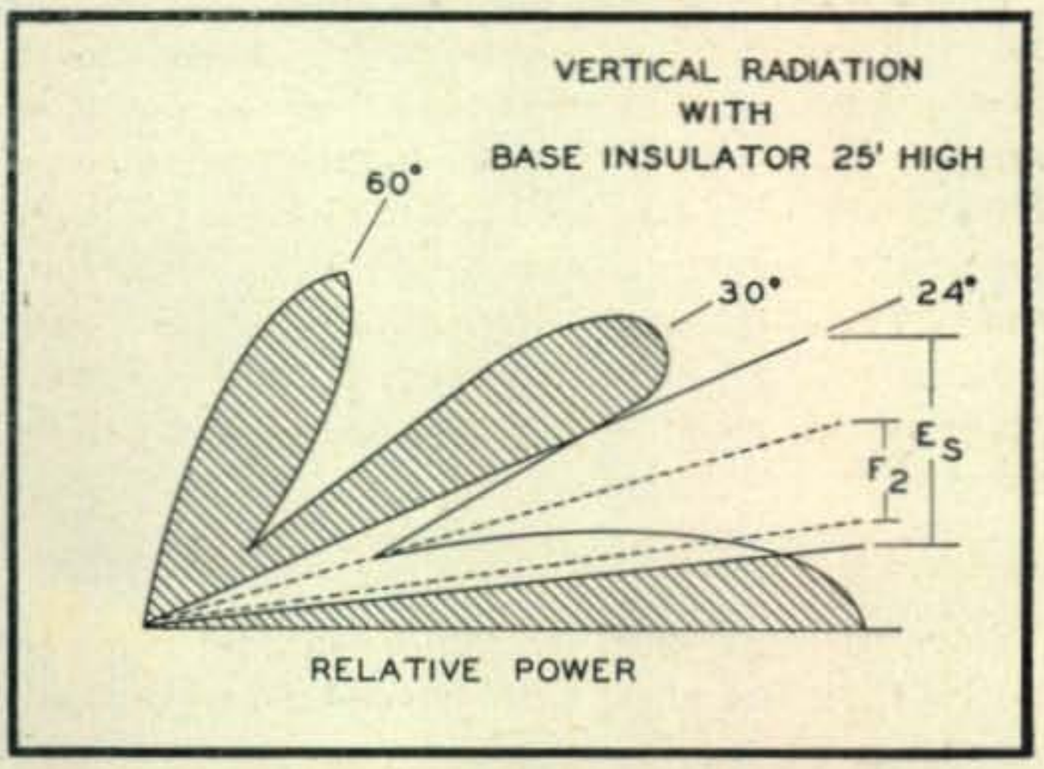


Fig. 1. Relative power radiated vs. the angles of radiation for a 10 meter half-wave vertical antenna with the base 25 feet above ground level.

Note: This discussion of the lobe patterns for the 10-meter vertically polarized antenna is based upon an average ground. This is considered to be a mixture of sand and loam. The moisture content of the immediate ground will affect the dielectric constant and earth conductivity. Radiation over very wet earth generally results in the vector ratio accentuating the higher angle lobes. In contrast, radiation over sea water tends to accentuate the lower angles of radiation.

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less angles. Few Hams have the facilities for getting the vertical much above a nominal height of 30 to 40 feet (height of base insulator). This height persists even today because of the stigma of "line of sight" communication when considering the erection of 10 meter antennas. Actually, the facts of the angle of radiation belie this time-worn hypothesis.

In *Fig. 1* is shown the relative power radiated vs. the angles of radiation for a 10 meter half-wave vertical antenna with the base 25 feet above ground level. Obviously, this radiator is doing much in the way of keeping several clouds very comfortable. A lobe of fair size occurs at 60 degrees. This corresponds to a short-skip hop amounting to about 80 miles — an impossible ionospheric condition on 10 meters. A second major lobe is radiated at 30 degrees. This corresponds to a range of about 210 miles—a short-skip condition which occurs very seldom. At the most useful angles of radiation, this vertical at this particular height radiates the least amount of power.

If we drop the antenna down about 9 feet to where the base is exactly one-half wave above ground level a very interesting thing happens. The 60 degree and 30 degree lobes combine at 40 degrees and the relative power radiated at this angle is approximately 50% of the total energy. Many verticals erected near this height above ground appear to work out on the longer reaches of short-skip. This condition is portrayed in *Fig. 2* where it can be seen that a certain small percentage of the power is now being radiated between 5 and 15 degrees. This corresponds to working from 450 to 900 miles.

It is unfortunate, but many times constructional difficulties do not permit the erection of the vertical 10 meter half-wave at its most effective height. That is, with the base only 4 to 6 feet above ground level. This is illustrated in *Fig. 3*. At this low height a very small minor lobe is found at about 80 degrees. The power lost here is only 7 to 8%. Contrastingly, the arc between 5 and 24 degrees is now filled in by the maximum radiated power and in the absence of minor lobes presents a solid front at all the important angles of radiation.

Using the Vertical on Long Range DX

Fortunately the problem involving the use of a vertical half-wave for 10 meter DX is not as complicated as it might at first appear. Here the propagation of 28-30 mc signals must depend upon the F_2 layer, which varies in height from 260 km to 390 km. The height variation can only slightly be anticipated. The maximum height and maximum density of the F region occurs one or two hours after the wave path sub-solar point. Or in other words, the maximum is a few hours after midday at the midpoint of the working path. This phenomenon has been observed by 10 meter DX men and is illustrated monthly in the *CQ* Prediction Charts.

Some years ago the R.C.A. Riverhead Receiving Station made a number of tests on 10 meters in conjunction with the reception of 7 meter trans-Atlantic television signals. These observations included the determination of the signal angle of arrival or radiation and since they are still applicable to this topic they are illustrated in the graph form in *Fig. 4*.

Although the height of reflection varied from 282 km to 378 km, a line of mean range versus angle of radiation may be drawn. The maximum angle of radiation will be directly related to the intensity of F region ionization. Referring to data collected during the last sunspot maximum we find that the minimum F layer skip distance, which is inversely proportional to the maximum ionization, was about 1100 miles. This corres-

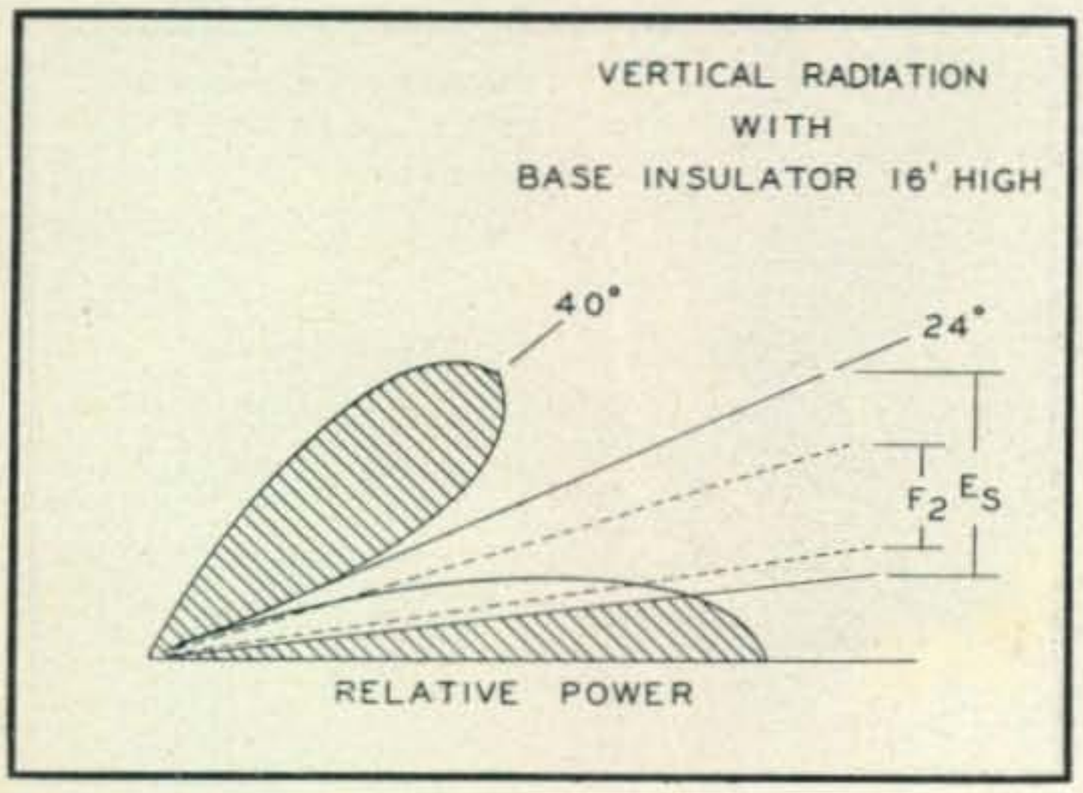

Fig. 2. Relative power radiated vs. the angles of radiation for a 10 meter half-wave vertical antenna with the base 16 feet above ground level.

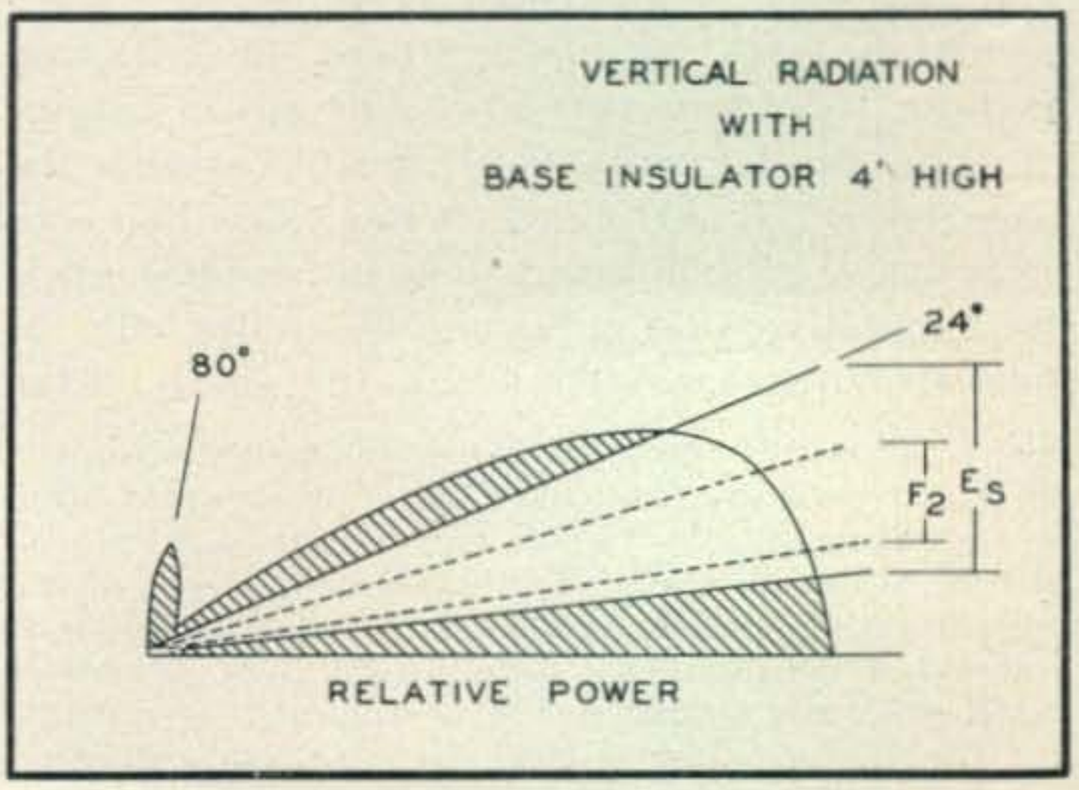

Fig. 3. Relative power radiated vs. the angles of radiation for a 10 meter half-wave vertical antenna with the base 4 feet above ground level.

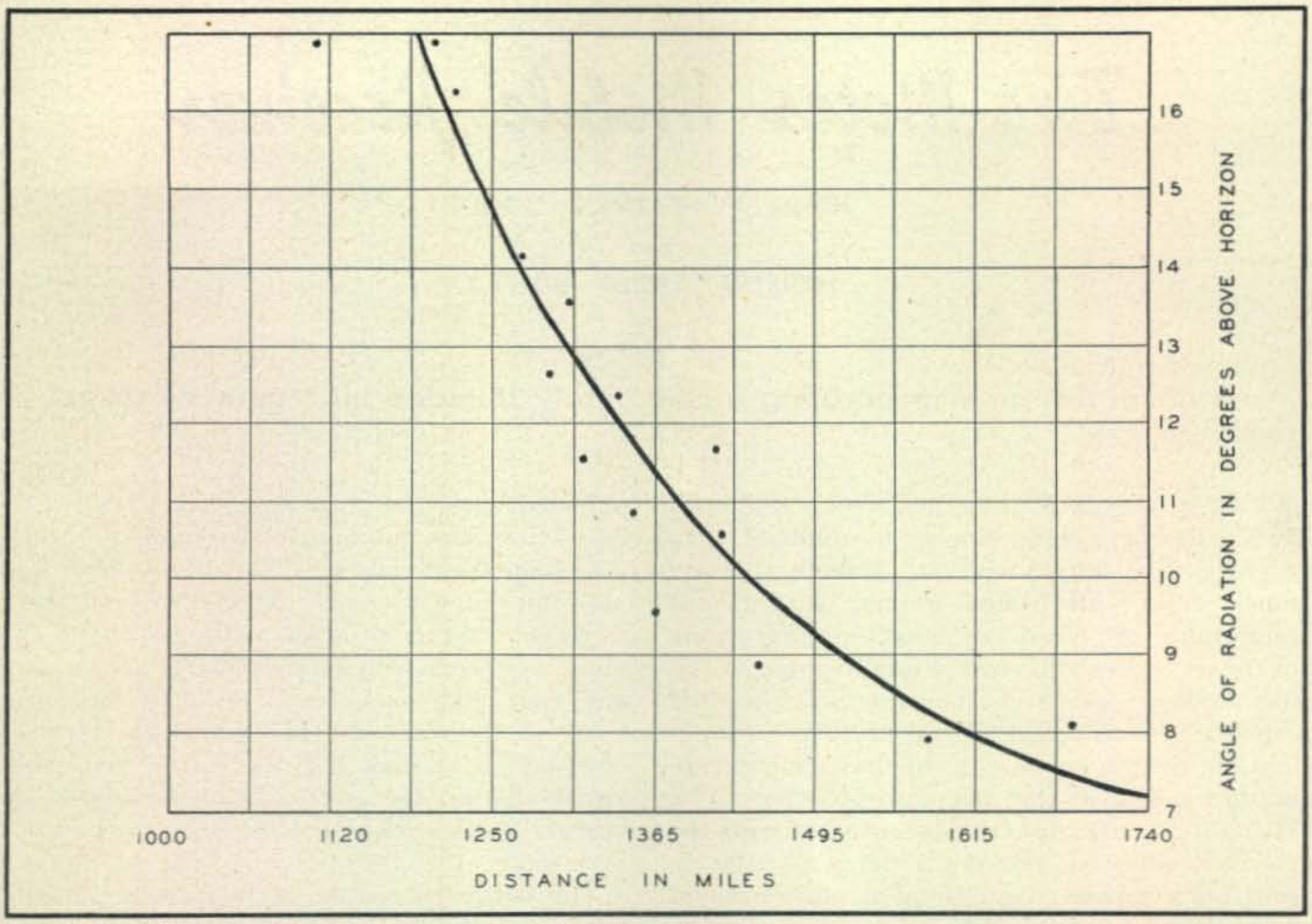

Fig. 4. Signal angle of arrival plotted against distance. Note that the minimum angle represents the maximum distance.

ponds to a general maximum angle of radiation of 17.5 degrees. This angle is illustrated in the *Figs. 1, 2* and *3* as the dashed line. The minimum angle of radiation should follow quite closely that of short-skip propagation. Possibly, there are frequent occasions where propagation does occur below 5 degrees, but it is the expressed belief that in working ranges beyond 1750 to 1900 miles, the propagation is by two or three hops. Employing the R.C.A. data the minimum angle is a little over 7 degrees; this is also illustrated in *Figs. 1, 2* and *3*.

Optimum Mounting Height

The vertical half-wave antenna does have an important place in 10 meter communication. If it were possible to put the antenna 100 or more feet above ground, many of the minor lobes would fill in the necessary angles for working either short-skip or DX. However, since most verticals have tended in the past to be antennas necessitated by space, time, and monetary expenditures it is well to keep in mind that for 10 and 11 meters the maximum power must be radiated between 5 and 24 degrees above the horizon. This can only be accomplished by keeping the vertical very low, with best results obtained when the base insulator is 4 to 6 feet above ground level.

There are two factors which can not be neglected in any discussion on 10 meter half-wave antennas. One of these concerns the circular pattern of the vertical antenna. For the average Ham this is a pure theoretical assumption. Every telephone line, house wiring line, building, guy wire and fence distorts the pattern till no two identical vertical antennas have identical horizontal patterns. This appears to be the reason for many verticals being placed as high as possible, but seldom above 30 or 40 feet. If it is impossible to mount the vertical low and with the favored directions in the clear, it will undoubtedly pay better to try some other type of antenna, unless you have several hundred watts of power to waste.

The second point concerns the term "ground." This does not represent a loose bit of wire insecurely wrapped around the nearest waterpipe. An efficient half-wave vertical antenna must be worked against an efficient ground. There are literally hundreds of excellent ways to obtain an efficient ground—starting from the 120 wire 3 degree radial system used by the broadcasting stations, down to driving several iron stakes in the ground directly below the antenna. This problem can be left to the ingenuity of each amateur, but remember the ground, to be a ground, must be direct and low-resistant.

Two-Meter Mobile Receiver

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and
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A novel design incorporating a completely shielded high-gain r-f stage

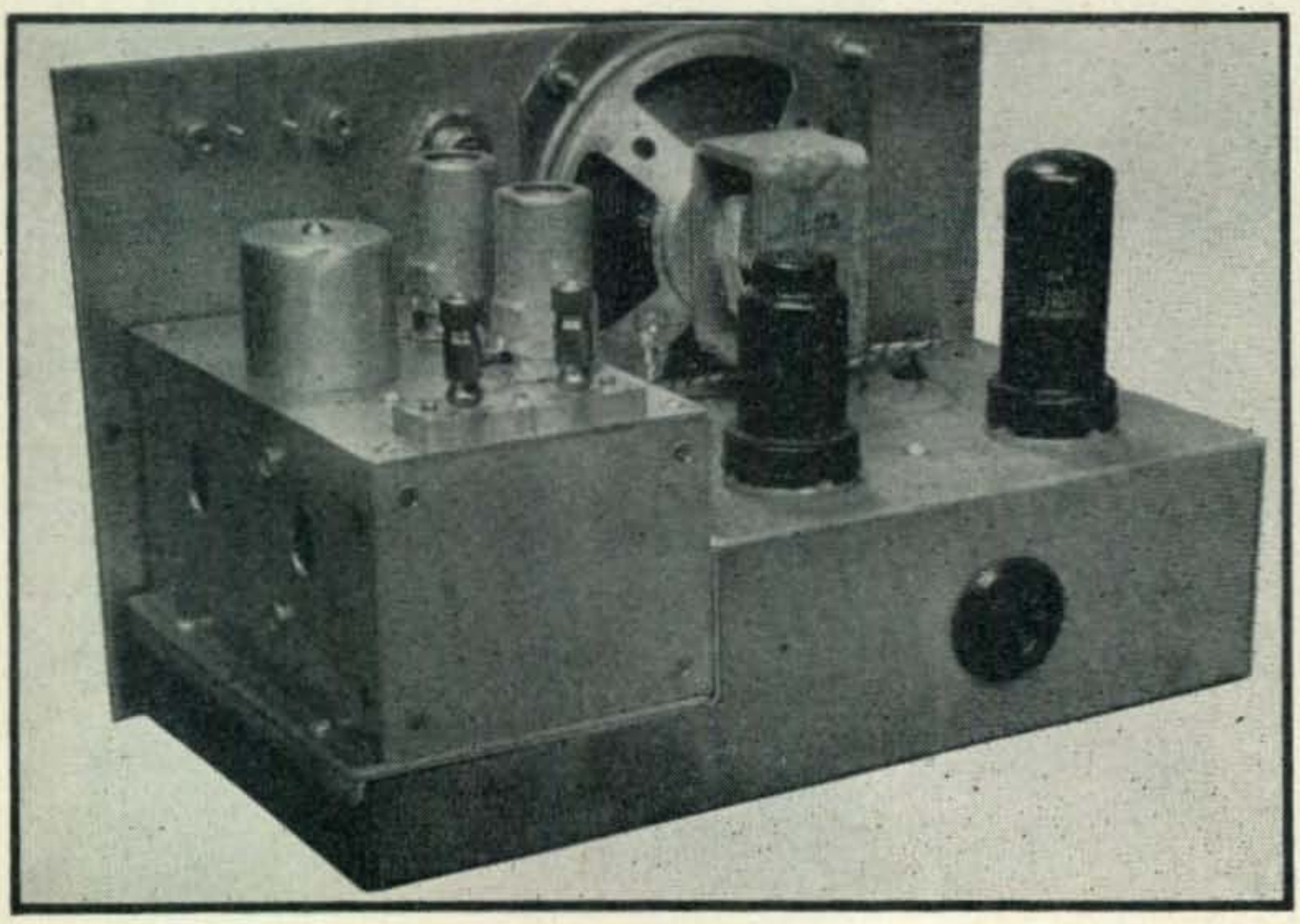
AT FIRST GLANCE the requirements for a successful mobile receiver appear no different than for a fixed station receiver. Actually they are much stiffer. Mechanical stability is of utmost importance and sensitivity must be high, because of the use of low antennas. Equally important, if less obvious—unless you have actually operated "mobile"—is the need for true single-control operation. Under the best of conditions mobile operation requires the manual dexterity of a Houdini. If one must be constantly retuning the receiver, adjusting antenna coupling and the regeneration control, even Houdini himself would have shied away from the idea.

R-F Stage

Unless an r-f stage is used, the antenna passing —and hitting—tree branches and other objects pulls the detector in and out of regeneration as well as detuning it. An r-f stage eliminates these effects, and allows the regeneration control to be adjusted once and then forgotten. It also reduces (but does not completely eliminate) radiation from the oscillating detector. Anyone who has built one will quickly tell you it is one thing to recommend an r-f stage and quite another to make one work well enough at 144 mc to give any gain, and not actually decrease the sensitivity of the receiver. The one in the receiver described here does slightly better than this; signals that are not quite readable without it are brought up to a readable level when the r-f stage is used.

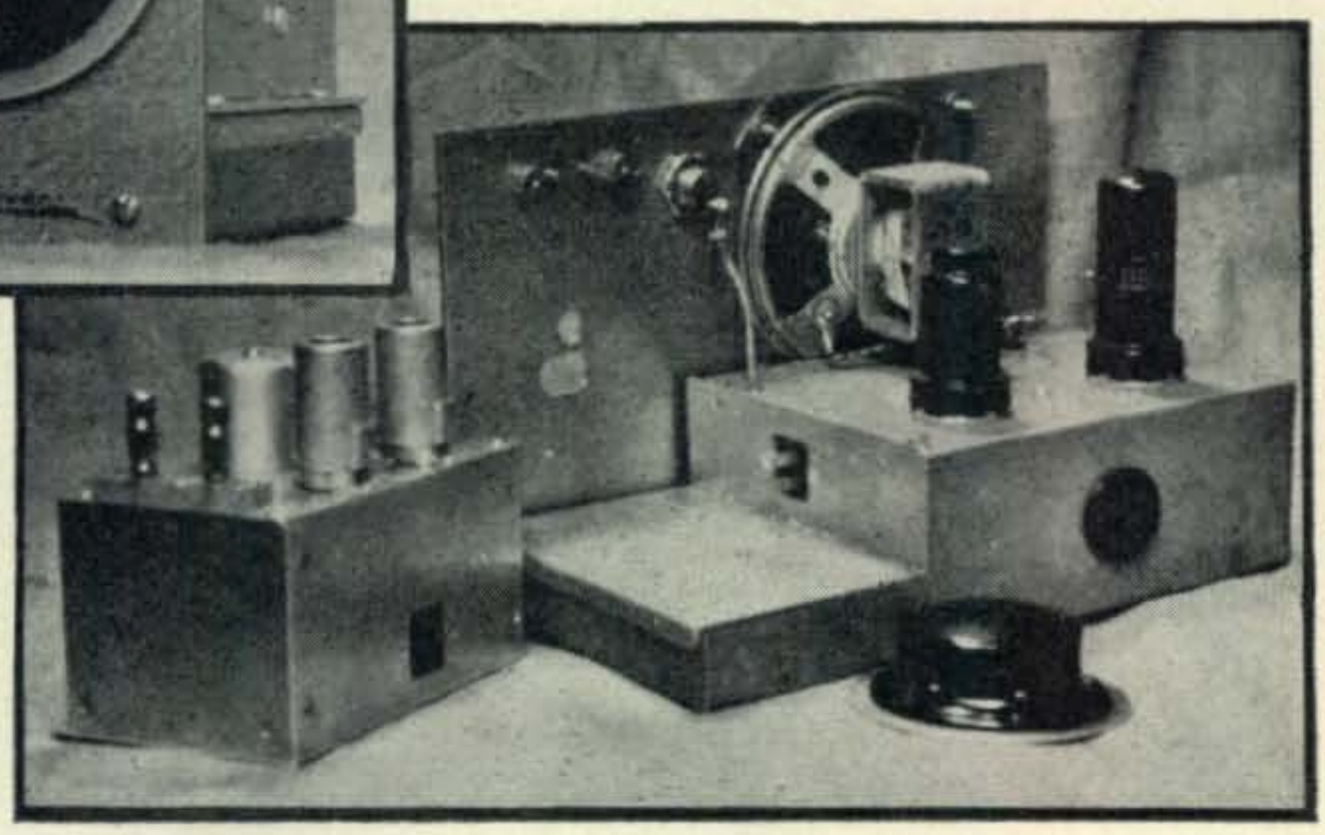
The entire r-f section is built in a self-contained aluminum box, 2¾" x 3" x 5", which plugs into the audio chassis. An auxiliary cable permits operation of the receiver when the r-f unit is removed from the chassis for adjustment. Separate pieces of aluminum fastened together with small flat-head machine screws are used to make the box. Any side can be removed for working on the unit. All parts, except the Jones plug, are mounted on the 3" x 5" top plate, and wiring can be completed before the sides and bottom are fastened in place.

[1] *1020 Whitcomb St., Gary, Ind.*
[2] *385 Johnson St., Gary, Ind.*



The entire r-f section is contained in a small aluminum box. Rigid mechanical connections will add stability. Components are located for minimum length leads.

(Left) The complete receiver is dressed up to give it a finished appearance. The two section chassis is clearly visible from the rear view shot. Power is brought in through the four-prong-socket.



(Right) The r-f section removed from the audio-chassis shows the Jones plug used for connecting the two units.

Note carefully that the partition shield goes directly across the socket of the 6AK5. The metal insert in the socket is grounded to this shield. Turn the socket so the control grid (*pin 1*) and the plate (*pin 5*) are on opposite sides of the partition. It cannot be emphasized too strongly that the more care taken to make the shielding complete, the better the receiver will work. Cut out from the shield only enough metal to clear the socket terminals.

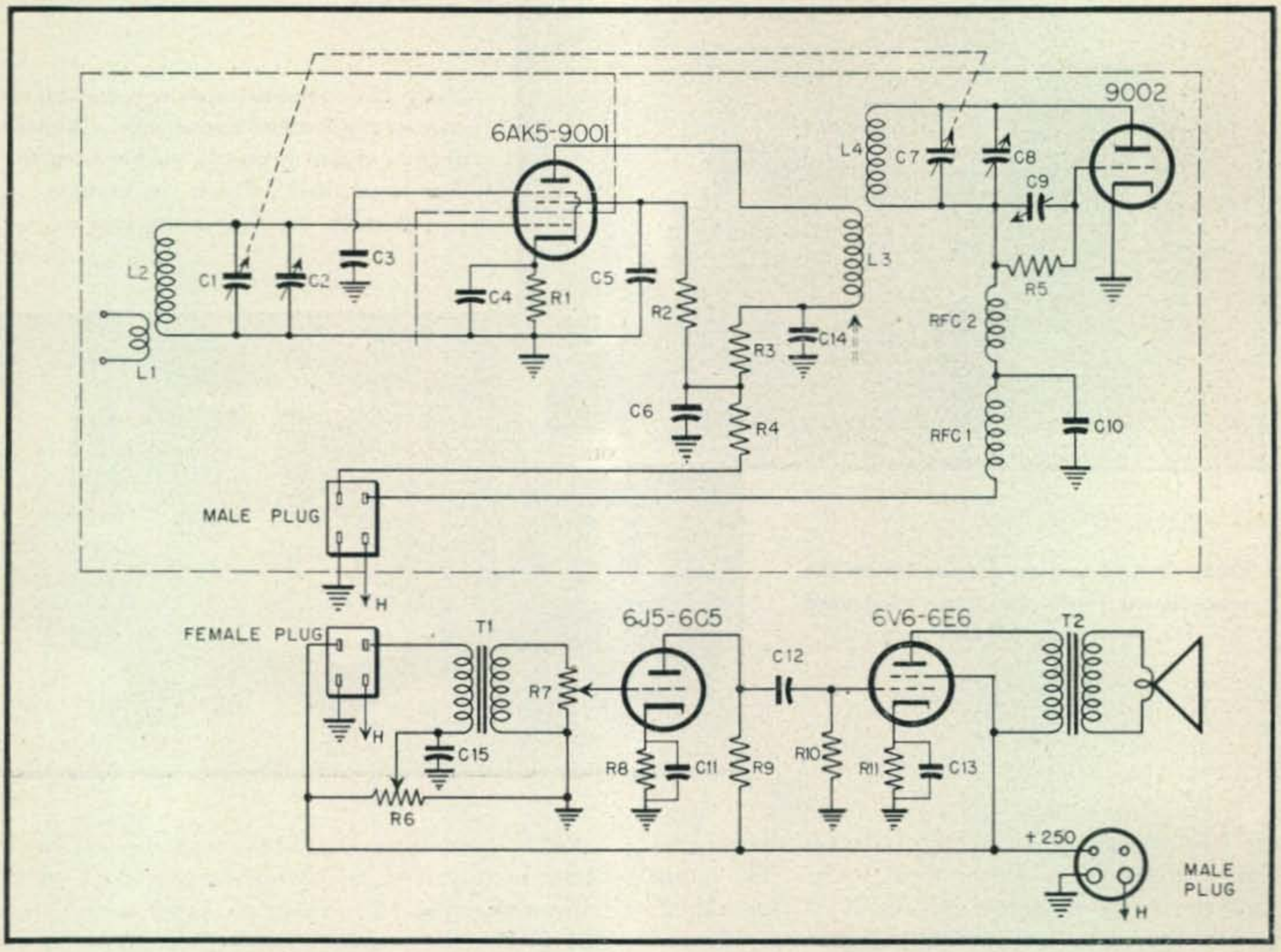
"Butterfly" Condenser

The "butterfly" tuning condensers are handmade, but after they were constructed Cardwell announced their model ER-6-BF/S condensers which are almost exact duplicates; so constructional details are omitted. This type of condenser has two advantages. Most important (in this application) they are much quieter, because the rotor bearings are no longer used for one contact. Secondly, a lower minimum capacity is obtained. The full capacity range of the condenser is covered in only 90 degrees. The 144-148 mc band covers only about 20 degrees, so this is really no handicap. Insulated couplings fasten the condensers together and to the dial. The 1.5-7 $\mu\mu$f trimmers are soldered across the condensers with practically no leads. They are tuned through holes in the side of the box with an insulated neutralizing tool. Both the variable condensers and the trimmers are mounted on two-inch blocks of $\frac{1}{4}$" lucite, which, in turn, is fastened to the top of the box.

The coils are wound on thin-walled, low-loss bakelite forms for rigidity. Spacing between turns is adjusted so the trimmers peak near minimum capacity. There is a powdered iron slug in *L3*, the primary winding of the detector coil. Its adjustment varies the inductance of the coil considerably, but its main purpose is to increase the coupling between *L3* and *L4*. Tight coupling increases sensitivity appreciably. These cores are not readily available commercially at present, but can be obtained at Army-Navy surplus stores complete with coil for a few cents each. They were used in several radar receivers. If the core is unobtainable, interwind *L3* and *L4*.

It might be thought that using a permeability loaded coil in the detector and a conventional coil in the r-f stage would prevent accurate tracking of the two stages. This might be true if the core was inside of *L4*. Actually, being inside of *L3*, it has only a minor effect on the inductance of *L3*. One setting of the r-f trimmer holds across the entire band.

The rest of the circuit is conventional except for *C9*, the detector grid condenser. Its adjustment will be described later. While a five-megohm grid leak is specified, results do not vary appreciably when its resistance is varied between two and ten megohms. The full supply voltage is applied across the regeneration control, *R6*, which is wire-wound to carry the current. Close to 175 volts are applied to the plate of the 9002 under operating conditions because of the very heavy loading of the circuit by the preceding stage. (Without load, the 9002 super-regenerates with less than 25 volts on its plate.)



Circuit diagram of two-meter mobile receiver. Following is parts list.

C1, C7—Cardwell ER-6-BF/S variable
C2, C8—1.5-7 $\mu\mu$f ceramic
C3, C4, C5—500 $\mu\mu$f mica
C6—.001 μf mica
C9—3-30 $\mu\mu$f, ceramic
C10—.004 μf, 600 v., paper
C11, C13—25 μf, 25 v., electrolytics
C12, C14—100 $\mu\mu$f, mica
C15—0.5 μf, 400 v., paper
L1—3 t. #16 enamel, 1/4" I.D., interwound with L2
L2—5 t. #16 bare, 1/4" I.D.
L3—4 t. #16 enamel, 1/4" I.D., permeability tuned
L4—5 t. #16 bare, 1/4" I.D.
R1—200 ohms for 6AK5, 1200 ohms for 9001, 300 ohms for 9003, 1/4 watt
R2—35,000 ohms, 1/4 watt
R3—500 ohms, 1/4 watt
R4—4000 ohms, 1/4 watt
R5—5 meg., 1/4 watt
R6—50,000 ohms, w.w. pot.
R7—250,000 ohms, pot.
R8—2000 ohms, 1/2 watt
R9—50,000 ohms, 1/2 watt
R10—500,000 ohms, 1/4 watt
R11—500 ohms, 2 watt
RFC1—80 mh r-f choke
RFC2—50 t. #24, on 1/4" polystyrene rod
T1—3:1 a-f transformer
T2—Output transformer
Tube shields—Johnson 278A and 277S (base)

Constructional Details

The 9½" x 5" x 2½" chassis has a 3¼" x 1½" step cut out of the righthand end, covered with aluminum, to accommodate the r-f section. The male half of the Jones plug mounts on the side of the step. The piece of aluminum forming the bottom of the r-f box extends ¼" beyond the outer side of the box. Two screws through this lip, combined with the Jones plug, hold the box firmly to the chassis.

This receiver fits in the glove compartment of a 1941 Buick. The panel was made 6¼" x 10" to allow room for the microphone handset to be stored in the compartment when not in use. Seven strips of aluminum, 4" x 3/8" x 1/8", with rounded corners, spaced ¼" form the bar-type speaker grill. They are fastened together with two screws, 2½" long. The last strip is threaded, and after assembly, the screws are ground off flush. Four 2-56 screws, tapped into the corners, fasten the grill to the panel.

Only a 2½" x 2" hole is cut in the panel for the four-inch PM speaker, but the volume is far more than can be used at any time. *C15*, from the arm of the regeneration control to ground, eliminates noise generated when the control is turned. It also increases the audio gain somewhat. If the receiver "motor-boats" when the volume control is advanced, increase the capacity of this condenser to as high as 16 μf.

Alignment

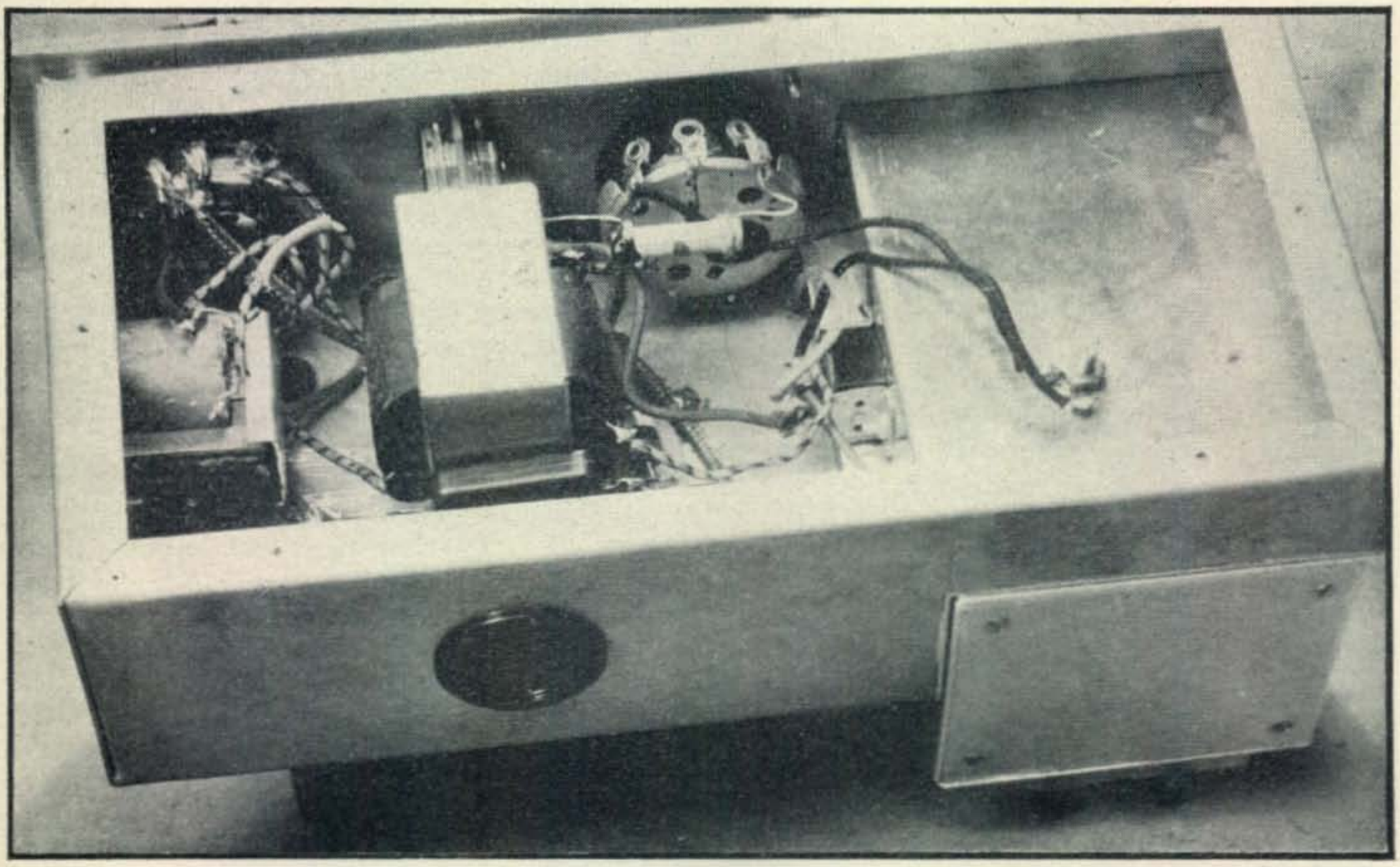
Tuning and peaking this receiver is little different than with any other. A signal generator, which may be another calibrated super-regenerative receiver, is most helpful for preliminary adjustments. With the 6AK5 out of its socket, pick up a very weak signal from the signal generator. Then adjust *C9* for maximum sensitivity. Slightly less than maximum capacity gave best results in this receiver. Once this is done *C9* may be forgotten. Replace the 6AK5 and with the iron core half in *L3*, set *C8* to center the band on the dial. Next, peak *C2* to bring the r-f stage in line. Unless all the shielding is in place, it is likely the r-f stage will break into oscillation as *C2* approaches resonance. For preliminary work any length of wire may be used for an antenna, but the final adjustment should be made with the antenna that will be used regularly. Different antennas have considerable effect on the setting of *C2*. Experiment with the number of turns on *L1* is also recommended. Sometimes grounding one side of *L1*, even with a two-wire feed line helps, and other times allowing it to float works better.

After *C2* is adjusted, the iron core in *L3* may be varied for greatest sensitivity. Remember to check the setting of *C8* each time the core is moved. The farther the core is inserted, the more the regeneration control must be advanced. As stated before, the r-f stage does not completely eliminate receiver radiation, and operating the detector at such a comparatively high voltage does increase the radiation. However, the radiation is still much less than from a receiver with no r-f stage.

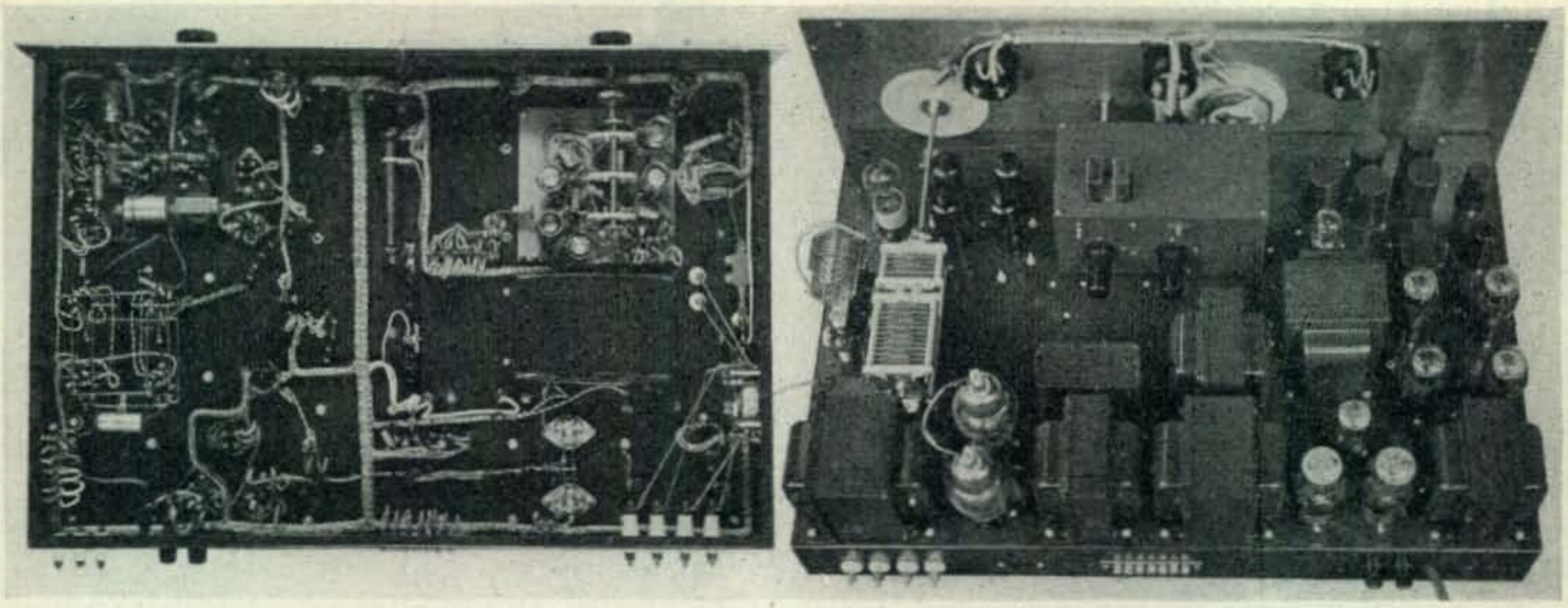
Should the r-f stage persist in oscillating even with all the shielding in place and the antenna connected, increasing the resistance of the cathode resistor will eliminate the oscillation. This reduces the gain of the stage somewhat, and should be done only as a last resort.

RFC2 is homemade and outperforms some commercial chokes, probably because it has no metal fittings. In spite of the much higher mutual conductance of the 6AK5 over 9001 and 9003 tubes, all three work about the same in the r-f stage. Previous experiments here tend to show that the higher the frequency used, the less important is the higher mu of the 6AK5. A 6C4 is interchangeable with the 9002 as the detector.

This receiver is used in conjunction with the 832-A mobile transmitter we described in *CQ* for August, 1945. The only change required to move the transmitter from 112 to 144 mc, was to replace the tank coil with one of 1/8″ copper tubing 5/8″ inside diameter, consisting of three turns.



Underneath the audio-chassis. Placement of components is not critical because there is no r-f wiring in this section. The wires running to the side of the chassis containing the r-f section are common grounds and not extended through the chassis.



With relatively few custom-built components the Temco 75-GA achieves unusual cleanness of appearance by careful attention to layout and wiring. A lot of equipment is contained on one large chassis with no crowding.

75 Watts in Full Dress

MORTON B. KAHN, W2KR*

COMMERCIAL TRANSMITTERS in the amateur field are becoming more common daily. Whether you are interested in building your own rig or purchasing factory-built equipment, features of commercial rigs are of interest to all hams. In almost every case the development of ham rigs has been under the supervision of amateurs themselves. Commercial rigs incorporate refinements made possible by better production facilities, but by and large they are ideas available for anyone to copy.

An interesting addition to commercially available units is the 100/75 watt phone—c-w rig manufactured by Temco. An all-band unit, incorporating variable frequency operation together with facilities for direct crystal control, it is unnecessary to employ any external equipment to permit frequency flexibility which becomes increasingly necessary as greater congestion of available channels occur.

Not the least unusual in the series GA transmitters is the provision to prevent obsolescence and allow for expansion. It is a feature well worth considering in designing any post-war equipment. By relatively minor design changes each unit can have added to it the components to raise the power up to the maximum legal input for amateurs.

V.F.O.

The variable frequency oscillator incorporated in the Temco transmitter closely approaches the frequency stability obtained from a crystal oscillator. The v.f.o. is a 6J5, triode connected, together with a Class A, 6AC7 buffer stage. A regulated power supply insures constant voltage to this section, thus eliminating frequency changes due to voltage variations. Broadly resonant plate circuits are employed in the 6AC7 buffer stage, as well as the following buffer, doubler and tripler. Each of these stages resonates over the entire width of the associated amateur band. Each plate circuit may be switched either to the TB35 final amplifier or to a following doubler or tripler stage.

The v-f-o tuning dial and the TB35 plate circuit adjustment dial are the only tuning controls required throughout any one frequency band. The final amplifier plate circuit utilizes standard 100-watt plug-in coil forms with built-in variable links.

All the intermediate plate circuits use inductively tuned systems for broadly resonating them together with the tube input and output capacities. Tuning is accomplished with metallic slugs and these adjustments are made under laboratory conditions at the factory and locked into position. The TB35 grid drive over the whole of each band is practically constant, and what small variations do occur at the higher frequencies, do not at any time provide for less than the required grid drive for the final stage.

Particular attention has been devoted to the design of the v.f.o. and associated Class A buffer stage. To insure a high degree of frequency

[*Continued on page 57*]

**Transmitter Equipment Mfg. Co.,*
345 Hudson St., N. Y. 14, N. Y.

H-F Operation of
PARALLEL TUBES

FRANK C. JONES, W6AJF*

Parallel 813s in an all-band transmitter for phone and c.w.

THE RADIOPHONE transmitter illustrated in the photographs and circuit diagrams was built primarily to prove that relatively high tube capacitances could be overcome and advantage taken of these troublesome items. The writer previously had used type 807 tubes in parallel at frequencies above 60 mc for several years of operation with good results as compared with the more usual push-pull circuits. The larger screen-grid 813 tubes have rather high capacitance for input and output circuits in the 30-mc range. An 813 has a rated input capacitance of 16.3 and output of 14 $\mu\mu$f, values which are in excess of the total value required in a tuned plate circuit at 30 mc for reasonable *LC* ratios. Putting two tubes in parallel doubles these capacities while push-pull halves them with respect to the tuned circuits. Push-pull operation requires an external split stator condenser for tuning the *LC* tank circuit to resonance. If this condenser is large enough to tune the circuit with proper

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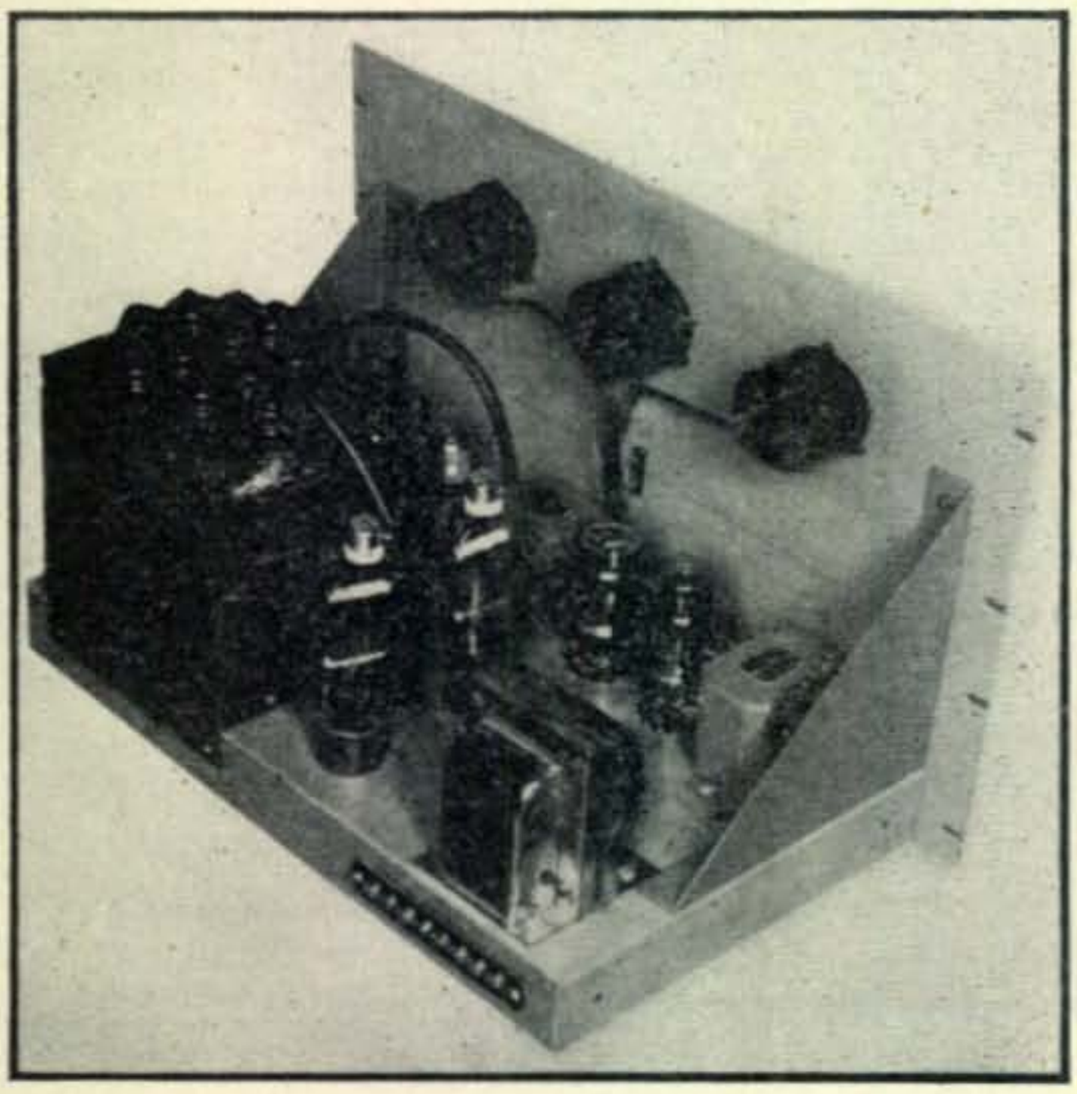


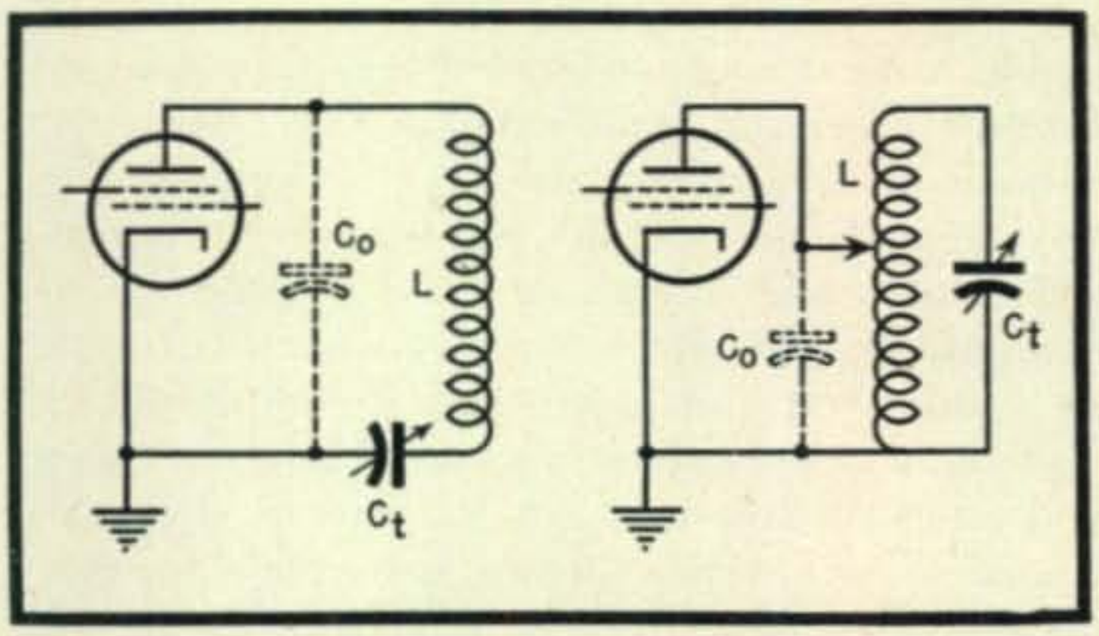


Fig. 1. (left) Basic series tuned circuit employed in final amplifier. Fig. 2 (right) Connections for parallel tuning accomplished by strap connections on coil plugs.

LC ratio at 3½ or 4 mc, its value even at minimum capacity setting is too great for efficient 30-mc or even 14-mc operation when added to the 813 output capacitance.

Push-pull operation requires twice the grid-to-grid peak r-f voltage as two tubes in parallel. This item may be of importance at higher frequencies where high peak voltage is difficult to obtain from low d-c voltage supplies and relatively small doubler-exciter tubes. Parallel operation offers some advantages in this respect provided the higher tube capacitances can be nullified or even used to good effect.

Series Tuning

It is possible to accomplish this by using series rather than parallel tuning at the higher frequencies. This permits the use of even more inductance than can be used with push-pull operation, and the net result is more r-f power into the antenna system at 14, 21, and 28 mc. Parallel tubes require relatively high *C* to *L* ratios at low frequencies unless the plates are tapped

Speech amplifier and TZ-40 modulators occupy one chassis. Meter panel contains instruments for entire transmitter.

across only a portion of the coil; for example, if the plates are connected to the center tap or a coil, the tuning capacity only needs to be one-quarter as great as if the plates were connected to the top end of the plate coil for proper *LC* ratio or "fly-wheel" effect.

In *Fig. 1* the basic series tuned circuit employed in this transmitter is shown, in which C_t is the tuning condenser and C_o is the parallel 813 output tube capacitance of 28 $\mu\mu$f. The range of C_t is from about 18 to 50 $\mu\mu$f, and is in series with the tube capacitance across the plate coil *L*. The resulting reduction of tuning range of C_t is an advantage at the higher frequencies for ease of tuning to any desired frequency in an amateur band, provided the plate coil has the correct number of turns (inductance).

The same tuning condenser C_t can be connected for parallel tuning as indicated in *Fig. 2* where the tube or parallel tube plates may be connected to any desired point on the coil for correct impedance match and *LC* ratio. In actual practice the changeover from series tuning to parallel tuning in a radio transmitter is easily accomplished by making a couple of strap connections between coil plugs on standard plug-in coils as shown in *Fig. 3*. The lower frequency band coils are connected to the 5-pin plugs, as shown in *Fig. 3a*, which automatically makes the circuit become the basic form shown in *Fig. 2*. The higher frequency band coils are strap-connected as indicated in *Fig. 3b* to form the basic series tuned circuit of *Fig. 1*. Once these strap connections are made for each 813 plate coil, operation on each band for series or parallel tuning is automatically obtained. In the set illustrated here, the original coil center tap was used for the plate tap on low frequencies and as the r-f choke tap on the higher frequencies.

Series tuning can be applied to parallel-tube grid circuits if link coupling is employed between the buffer-tuned plate and grid tuned circuits. The same general type of coil strap system can be applied to standard plug-in 50 watt coils provided an external fixed link coil is used instead of the one normally attached to the plug-in coil form pins. In the transmitter shown here, a form of unity coupling was used with the grid coil untuned. The tube input capacity and grid coil do not resonate within any amateur bands. The grid coil needs to be tightly coupled to the buffer plate coil but should not have enough turns (inductance) to resonate with the 813 input capacitance within the amateur band. This is a little difficult at 30 mc, where the 813 input capacitance of about 26 $\mu\mu$f looks like a fair-sized tuning condenser in value. As a result, the 30-mc plate coil (and interwound grid coil) has a low *L*-to-*C* ratio and a 6AG7 doubler operates at pretty high plate current.

An 807 was substituted for the original 6AG7 tube in order to insure better tube life for 28- to 30-mc operation. The present war-surplus price of 807 tubes made them very desirable for use in any exciter stages, even in the crystal oscillator. The type of Colpitts "harmonic" crystal oscillator used in the circuit of *Fig. 4* will function very well with any tetrode or pentode

Oscillator Coil

35 turns #22 DCC, 1¼" long x ¾" dia. tapped at 9 and 17 turns from plate end.

Buffer Coils

(1½" dia. plug-in forms)

4 mc — Pri.—25 turns #22 DCC, 1¼" long.
Sec.—25 " #26 DSC, close-wound at end of primary.

7 mc — Pri.—16 turns #20 DCC, 1¼" long.
Sec.—12 " #22 DCC, interwound

14 mc — Pri.— 7 turns #20 DCC, 1¼" long.
Sec.— 5 " #22 DCC, interwound.

21 mc — Pri.— 5 turns #18, 1¼" long.
28 mc — Sec.— 3 " #18, interwound.

Final Plate Coils

4mc—34 turns, #12, 3½" long x 2½" dia.
7 mc—18 " #12, 3" long x 2½" dia.
14 mc—15 " #10, 3" long x 2½" dia.
21 mc—12 " #10, 4" long x 2½" dia.
28 mc— 6 " copper tubing, 4" long x 2½" dia.

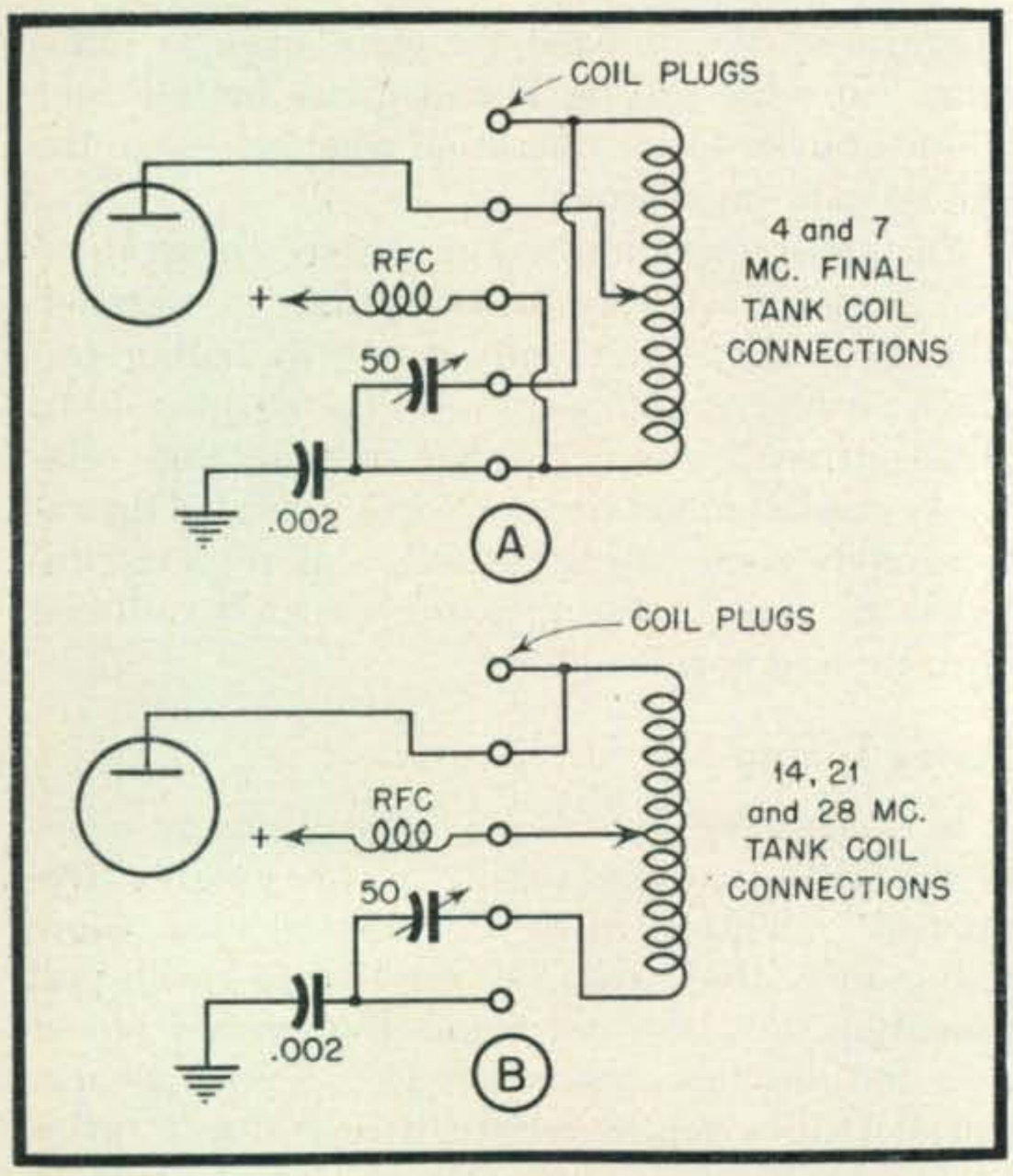
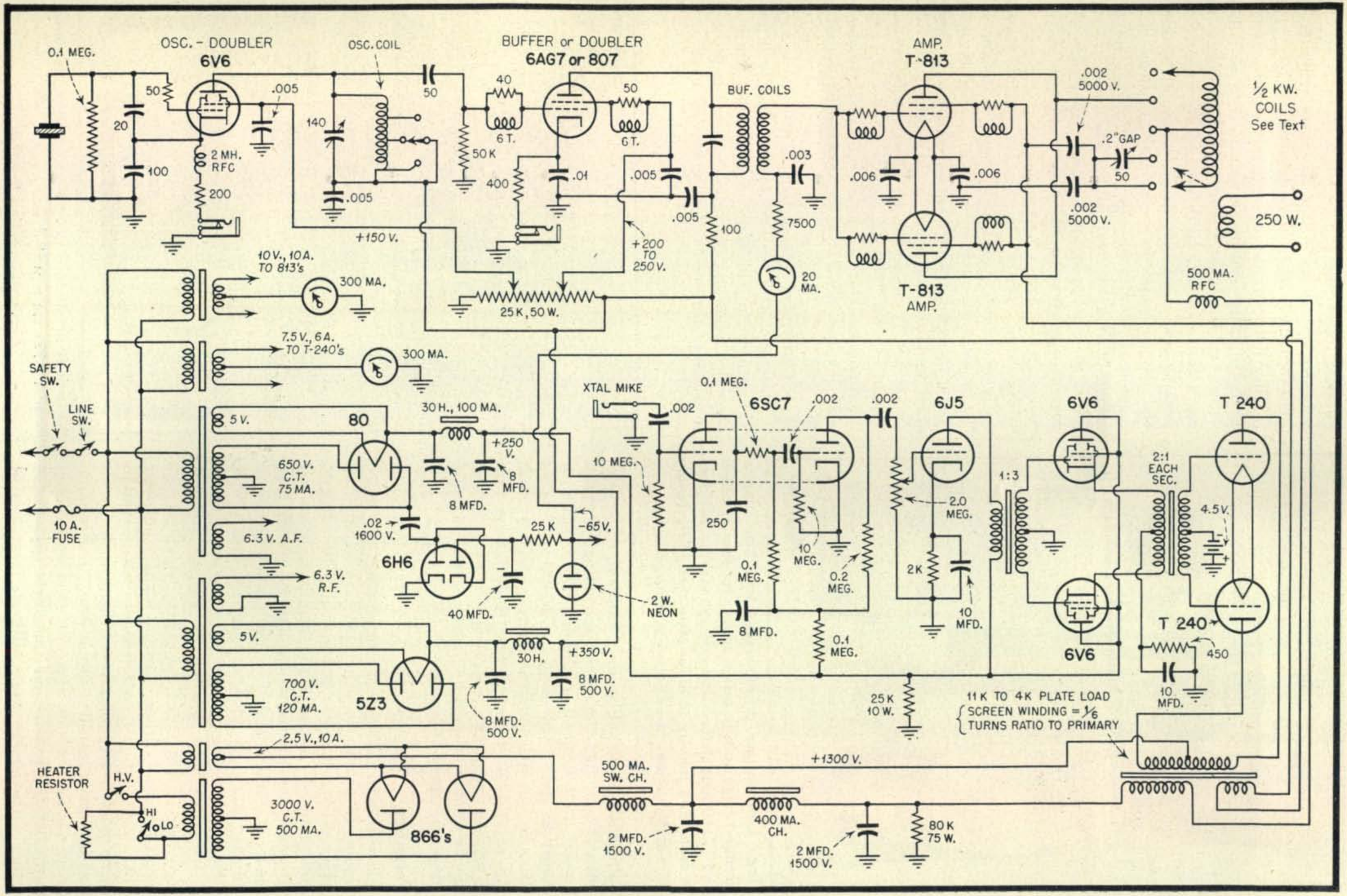
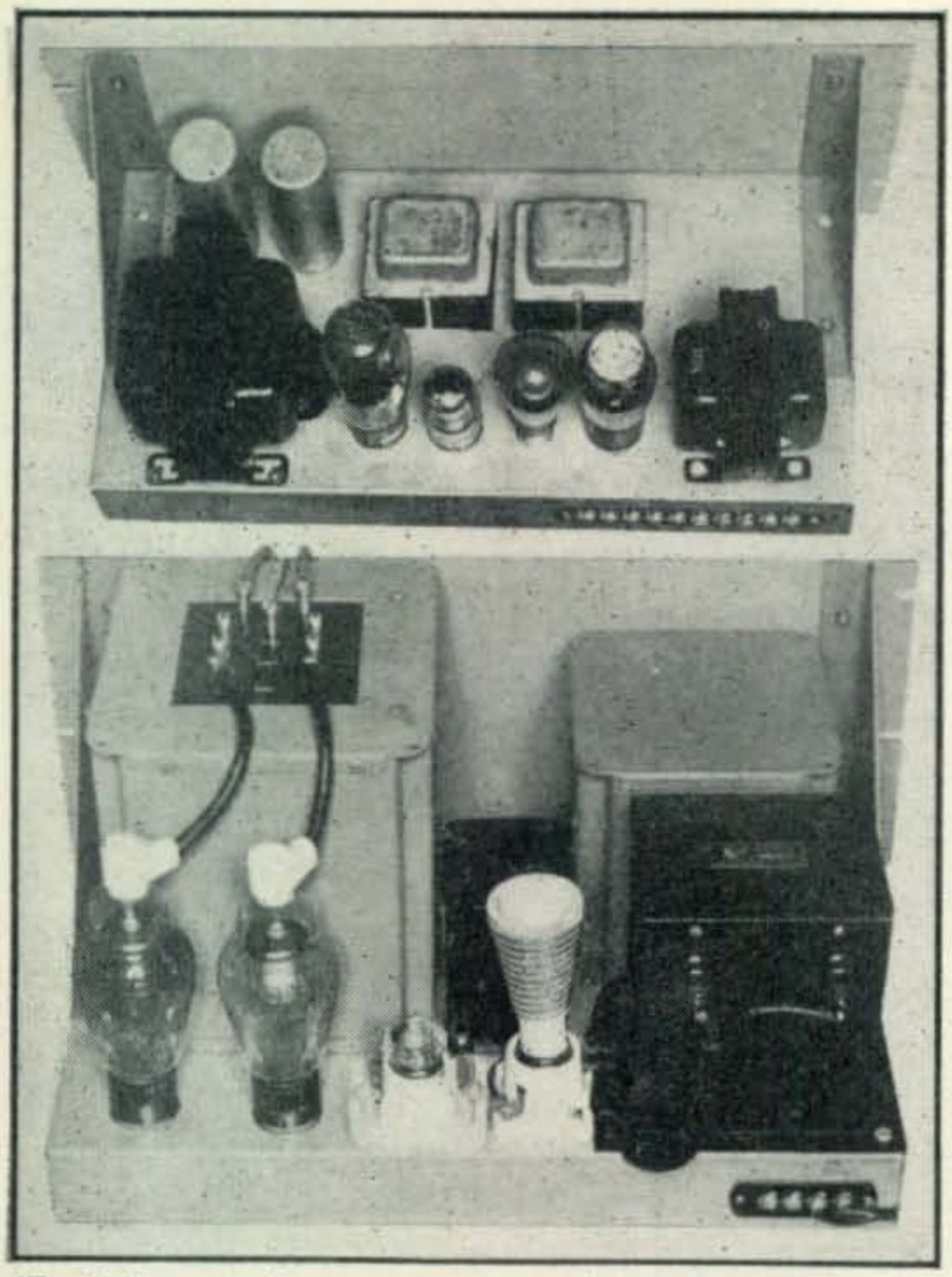


Fig. 3. Method of strapping connections between coil plugs on standard plug-in coils. Strapping as shown on top (A) gives parallel circuit drawn in Fig. 2. Connected as shown on bottom (B) gives basic series tuned circuit of Fig. 1.



Circuit diagram of parallel 813 transmitter.



(Top) Low voltage power supply and bias supply. (Bottom) High voltage power supply for final amplifier and TZ-40 modulators. Heating unit may be switched in series with primary to lower plate voltage for tuning up transmitter or operating at reduced input.

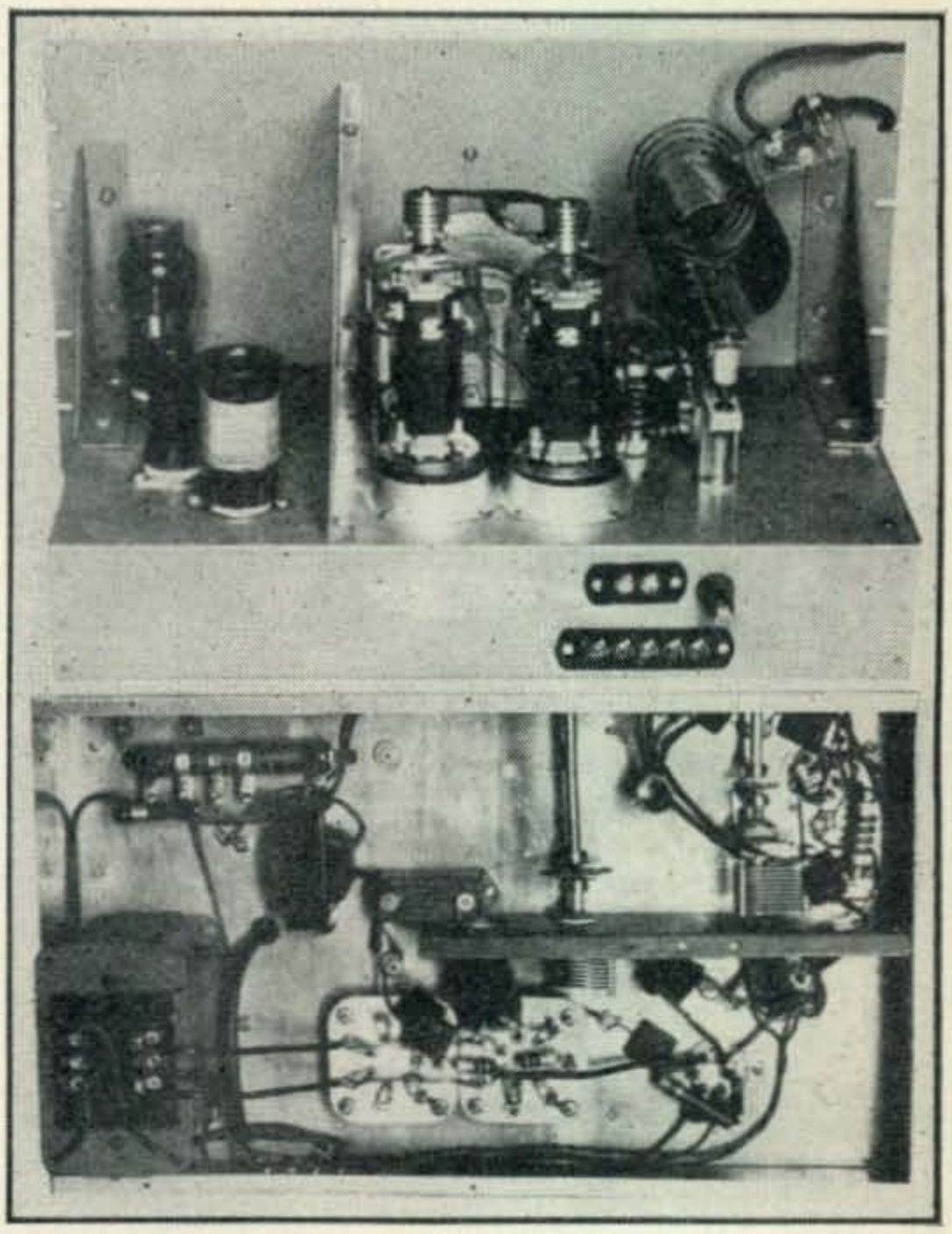
tube with remarkably low values of r-f crystal current provided the d-c screen voltage is maintained at a low value. The type of oscillator shown in *Fig. 4* will supply over 100 volts of r-f drive to the 807 buffer or doubler stage without the crystal current exceeding 10 to 20 ma with 4 or 7-mc crystals. The oscillator plate circuit can be tuned to the crystal fundamental or second (or even, third) harmonic.

Parasitics

Screen-grid tubes are not subject to much trouble from low frequency parasitic oscillations which often are bad in triode amplifiers with grid and plate r-f chokes of the 2-millihenry values. However, v-h-f parasitic oscillations readily take place in single, parallel or push-pull screen-grid tube circuits. It is good insurance to put simple v-h-f parasitic suppressors in each control and screen grid circuit. The r-f voltages and currents are relatively small at these points, which permits the use of small carbon resistors for this purpose. Fifty to 200-ohm 1-watt resistors with about 6 turns of #18 wire wound over them, make excellent and easily installed suppressors. The ceramic sleeve on the resistor makes a good midget coil form and the resistor pig-tail leads twisted together with the #18 wire coil leads form a good support for wiring the suppressors between the tube socket contacts and the tuned circuits or high frequency by-pass condensers.

The 813 tubes have enough grid-to-plate capacitance to cause self-oscillation in the amplifier shown in the photograph. This tendency to oscillation was stopped by connecting the screen-grid by-pass condenser back to ground through the plate by-pass condenser. Both of these mica condensers should have a high working voltage rating of at least 2500 volts. The degenerative effect of this connection apparently offsets the regeneration present from other sources in the 813 stage.

The audio system in this transmitter has a cathode follower push-pull stage to drive the TZ40 class B modulator stage. This type of driver has a much lower driving source impedance than would a pair of 45 or 2A3 tubes. A twin triode 6SC7 connected as shown will provide a gain of over 1000 for connection to a crystal microphone. The hum levels (and distortion) are very low in a 6SC7 if the cathodes are grounded and grid leak bias from 10-megohm grid resistors is used instead of cathode bias. This tube without a split resistor in the first plate circuit, will provide stable amplification of over 3000 times in the voice range but care must be taken to prevent overload of the second section in that case.



R-F unit is simple and straightforward in appearance. Parallel 813s are mounted side-by-side with common connections tied together.

Monthly DX Predictions --- SEPTEMBER

OLIVER PERRY FERRELL*

Comments and Problems

Comments from the users of the Band Predictions are invited and are of interest to CQ and to the IRPL. If you have some transmission problem directly involving conditions for DX-ing or want to know what would be the best average hours for working a certain city from your location you are invited to write to the Propagation Editor, CQ Magazine, 342 Madison Ave., New York 17, N. Y. Please enclose either a penny postal or a stamped self-addressed envelope for reply. Allow 7 to 10 days for reply.

THE UNPRECEDENTED and astounding rise in the number of sunspots in late spring and summer of 1946 is an excellent reason for getting your transmitter, antenna and receiver in tip-top shape for the late fall and winter DX. Latest reports indicate that the period between the sunspot minimum (1944.1) and the next sunspot maximum will be the shortest in the records of this phenomenon. All this will mean that DX conditions this fall and early winter will be on the par of those in the late winter (Jan.-Mar.) of 1937. By the spring of 1947 it is expected that conditions will equal the best days of 1938 and by the fall of 1947 (when the sunspot maximum is now predicted) DX conditions will be unsurpassed by any previous observations.

**Propagation Editor, CQ*

This month and hereafter, because of some well-founded constructive criticism by W6QYT and others, a few changes in the physical appearance of the prediction graphs have been made. It is now thought that the graphs will be somewhat easier to interpret directly with a minimum amount of time. *Fig. 1* illustrates the essential points in a sample graph, which by the way is the plot of the average working frequencies for the month of September on a path from W6-W7 to ZL and eastern VK. The upper plotted line on any of the graphs may be considered the average maximum usable frequencies (MUF) for the corresponding time values (vertical lines) over the path listed in the caption. Directly below that line and following the trend of the MUF outline is the optimum working frequency. The OWF, as it is called, is based upon the fact that DX over certain paths is likely to stay in for a given period of time. Therefore, any horizontal line connecting the ascending and descending slopes of the OWF outline indicates the period which that particular frequency (horizontal line) should be completely satisfactory for communication.

If for example, we were in San Francisco and wanted to work Sydney, Australia (see *Fig. 1*) for about an hour or so after 2000, what would be our best bet in September? Following up the vertical line denoting 2000 hours PST we find that

[Continued on page 54]

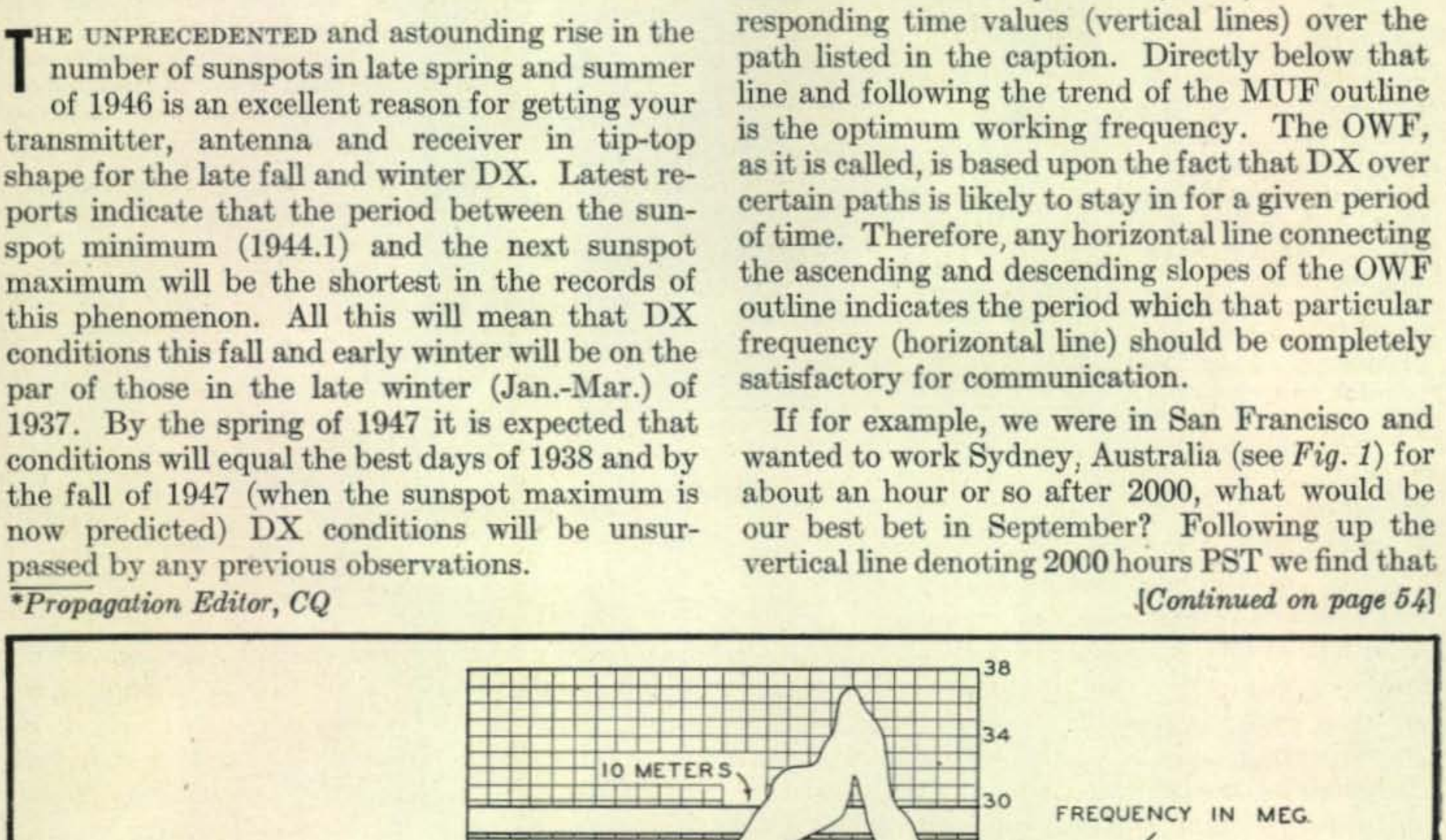


Fig. 1. Sample graph illustrating new method for presenting monthly DX predictions. Use of graphs is fully explained in text. This sample is based on the West Coast of United States to New Zealand and Australia. September 1946 average.

Designing the

LAWRENCE
LeKASHMAN
W2IOP

WINKW shows a clean-cut solution to today's housing shortage. Located in a closet 38" x 34" the low power c.w. transmitter run 20 watts to a 6L6. Plenty of space for odds and ends. Lighting, transmitter, receiver, and monitor are controlled from panel on right hand side and switch under monitor.

W2TC shows another solution to the present day space shortage. Nothing has been omitted from this all-band 500 watt phone—c.w. station that comfortably fits into the end of a narrow room. The typewriter well and desk attachment were obtained from surplus, but similar units are standard commercial items.

PLAN YOUR NEW amateur station wisely! Postwar amateur radio equipment is better than ever; don't make the mistake of housing it in a "shack" which is so inadequate that it will spoil half your fun.

Many hams are scrambling to get back on the air as quickly as possible, and in doing so they are neglecting many fundamentals of good station design. Getting the rig back on the air is very naturally the first thought, but more often than not, it excludes all considerations of comfort and appearance. Think back for a moment, to prewar days and the enjoyment which you got from amateur radio as a hobby. How many hours a year did you spend in your station? How large a part did radio play in your recreation? How much emphasis, therefore, should you give now to the design of your station for fuller enjoyment? The new amateur must bear in mind these considerations in his future ham plans.

Plan Ahead

If you expect to spend only a moderate amount of time on your hobby, then you should consider designing your shack so that it can serve more than one purpose. Plan your station as a center of recreational activities, so other members of your family may enjoy its facilities. You will benefit from the congenial atmosphere and cheerful furnishings.

If, on the other hand, you are a rabid fan, then rightfully consider using a certain amount of space exclusively as a radio station. A man's ham shack is his castle! Perhaps the ultimate satisfaction for a radio amateur is to have a space entirely his own, in which he can combine workshop, study and radio station.

Using Limited Space

For many hams available space is limited, as for instance in a small apartment. When space is at a premium, ingenuity is called upon heavily. Now, perhaps more than ever before, it is possible to get a lot of radio equipment into a very small space. Tricks learned during the war will prove their usefulness where compactness is a factor. Amateurs can learn many useful methods from the radio installations in the cramped quarters aboard aircraft and small combat boats . . . . whose origin often was a pre-war ham design.

Relatively permanent components of the station should be given special consideration in your planning. The power supply is a good example.

Post-War Ham Shack

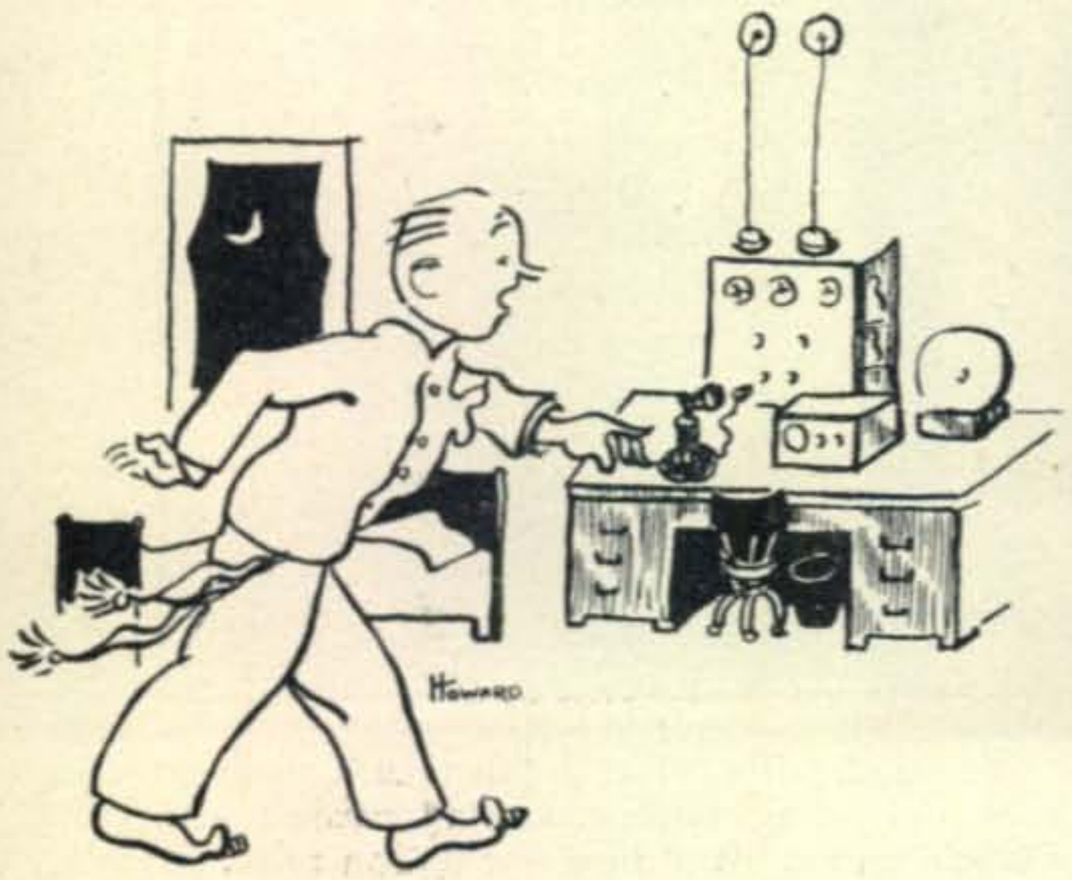
Good design for transmitters, receivers, and antennas doesn't guarantee a first-rate station. Here are some general considerations that provide the finishing touch—a comfortable operating position.

Although r-f and a-f circuits are changed frequently by most amateurs, a well built power supply is very seldom altered. Why not put the power supply in a safety case and get it out of the way? Put it in the closet or under a desk. Running the necessary high voltage lines is neither difficult nor dangerous provided that proper precautions are taken. Filaments of course should be supplied from a transformer relatively close to the tube, because long leads tend to introduce a voltage drop and excessive r-f pickup. Obviously, only the rectifier filaments should be included in the power supply.

There are several advantages to be gained by a separate remote power supply. You gain more room where it is most valuable, you allow greater freedom of design, and if the remote location is properly chosen, hash in the receiver is more easily minimized. Purely mechanical noise from vibration can be done away with entirely.

Recreation Room

If space is not a difficult problem, you can borrow many useful ideas from the modern architects who have given much thought to the design of recreation rooms in homes. Most hobby rooms before the war were useful only for ping-pong tables and clothes lines. The architects think that this is wrong; they feel that a hobby room should be a center for the spare-time activities of the entire family. Flexibility of arrangement and a sensible segregation of different activities keynotes each of their designs. The noisy, often messy work bench should be separated from the portion of the room used for study or reading. The materials used should be chosen for the hard wear which may be expected in a playroom or ham shack. At the same time, they must be attractive enough to make the room pleasant. Storage space should be engineered so that there is adequate room for all the "junk" which ordinarily accumulates in a room of this type. Lockers, closets and shelves should be provided so that a neat, orderly and uncluttered appearance may be preserved.



Double Duty

There is no reason why the well planned amateur station can't do double duty as a guest room. The minimum furniture requirements would be a studio couch convertible into a bed, at least enough drawer space for overnight equipment, and a bed-side table with a reading lamp. Furniture must be comfortable, durable and good looking. Wherever possible it should serve a dual role, as for instance the studio couch just mentioned. These things contribute to the livability of your ham shack as much as they do to your hospitality!

A good sized desk, preferably with a compartment for a typewriter, makes an excellent location for your receiver, log books and message forms. In a permanent installation built-in tables provide custom design utility at relatively low cost. A small bookcase is extremely useful for magazines and technical books. A cork-board bulletin board is useful to display QSL cards, photographs and drawings. Good lighting is especially important; a fluorescent desk lamp if properly filtered, will do a lot to increase your comfort.

Decorating Materials

The materials selected for decorating a hobby room should express the character and function

of the room itself. Linoleum for floors, for instance, is much less likely to be damaged or soiled than a rug. It can easily be cleaned and kept new looking. Upholstery materials are available which can be cleaned with a damp cloth, and which will stand long hard use. For the ham who wants to go all out in making his station as handsome as he possibly can, many new materials are available which can be blended together to make the ham shack part of the house itself. So many combinations are possible which are both practical and in good taste that only a handful can be mentioned.

Building Materials

If you build your station in the cellar of your house you must be careful of damp floors. While a concrete surface may seem to be dry, actually it releases a great deal of moisture by evaporation. Asphalt tile was specifically developed to withstand the alkali driven from the concrete by this moisture, and makes an ideal flooring for a ham station in a basement.

Attic rooms present different problems. They are usually very hot in the summer and very cold in the winter, but they are ideally located for connection with antennas. New types of insulating materials are available which make it possible for an attic shack to be made just as livable as one any place else in the home.

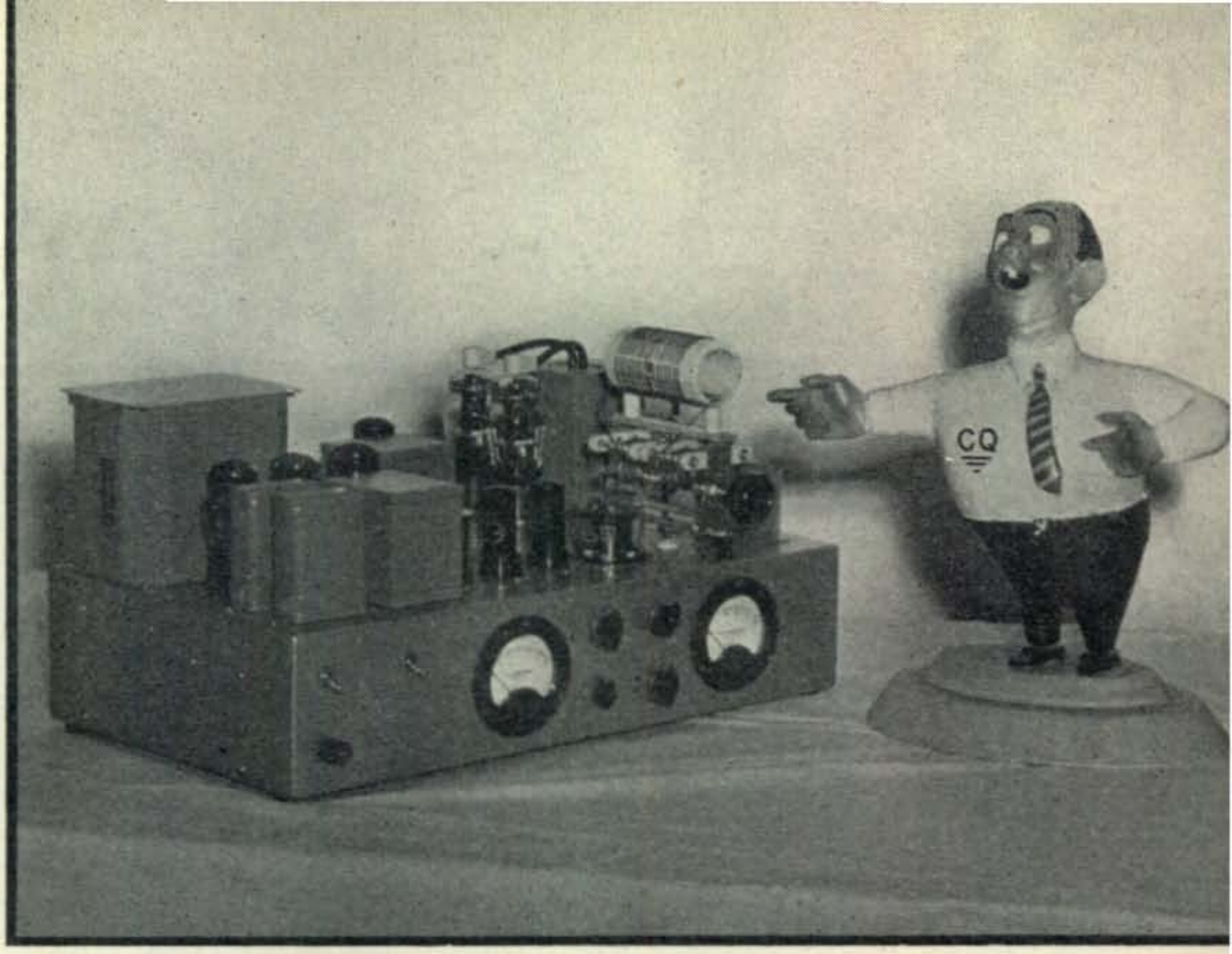
Inexpensive prefabricated cabinet and shelf units will soon be available which will make possible an orderly and logical arrangement of working materials. Tools are most useful when they are readily accessible; precision apparatus such as test meters must be protected when not in use. Adequate storage space can therefore contribute materially to your convenience.

It is well worth considering the rest of the family in planning your station. You should try to select a location which will not be in the way of other domestic activities and which will by the same token protect you from the disturbance of people constantly walking back and forth while you are trying to operate or work.

From the economic point of view, planning along these lines is not expensive. You would be reluctant to spend hard-earned dollars to furnish your ham station if you did not feel you would get an adequate return in added enjoyment. If the room which houses your station can be shared and enjoyed jointly with other members of your family, then the expenses may seem very small indeed.

Plan now to make your radio station an attractive part of your home. You will insure yourself of more pleasure and more satisfaction than you ever before had!

W9CVU puts a lot of equipment on a standard office size desk. The secret to this trick is absence of haywire of any sort. The practice of running control leads, interconnecting cables, etc. draped all over the shack should be number one taboo on the list of post-war station rules.



The world's biggest transmitter is examined by an amazed visitor in the CQ shop. The rig is W2IYO's 100 watt all band affair.

DEPARTMENTS

- *CQ DX*
- *YL'S Frequency*
- *UHF*
- *Parts and Products*
- *Letters*
- *Postscripts and Announcements*

CQ DX

By HERB BECKER, W6QD

[Send all contributions to Herb Becker, 1406 South Grand Ave., Los Angeles, 15, Calif.]

NOW THAT you have had about a month of activity on the 20 and 40 meter bands what do you think of them? I can answer that question for a flock of boys, and every time the question is brought up, their opinions of conditions on the 20 meter band are the same. For example: they say, "It's dog eat dog," or "a real rat race," or "just doggone disgusting." There are, of course, variations of these comments, some of which I have forgotten, and others we won't try and print. The odd part of it is, night after night the old gang seems to come back for more. There seems to be plenty of stuff in there, and in many cases, the patient operator will grab a few choice ones. When the 20 meter band first opened yours truly wasn't quite sure what the edges of the band were, that is, judging from what I heard on the air. For the life of me, I couldn't tell where 14,100 kc was. However, after a week or so the region between 14,000 and 14,100 began to clear up very noticeably. Could be the monitor stations had something to do with this!

Maybe you fellows think it is a lot of fun to work DX on 20 meters but I know many of the gang who have lost all sense of balance when it comes to snagging them. For example, the other night a certain rather elusive DXer was tossing out a CQ and before the guy had a chance to sign, the whole band seemed to collapse and fall right in on him. Actually, there must have been 15 or 20 stations who pounced on the guy ... and right smack on his frequency. Result: This DX station came back to no one . . . he was probably as confused as those calling him. Then the payoff . . he started CQing again, but in the meantime a few of the Ws, thinking the DXer was still looking for someone to work, began calling him frantically again. Final result: DX man and Ws on the same frequency calling at the same time. You see, this DX game really is fun . . . "ain't" it?

EL4A

We received a nice letter from Cliff Evans, EL4A. Cliff says there are only two stations in Liberia; one of them is EL3A, Rupert Lloyd, at the American Legation, and himself, EL4A. He says he is running about 400 watts input and seems to be getting out pretty well. He wasn't quite sure of the crystal frequencies which he ground down himself, but thought it was around 14,160. EL4A is with the Pan-American Airway boys at Roberts Field, Liberia. Up to the time of writing his letter he said about the best time to work him would be from 1600 GMT to about 0300 GMT. He operates both phone and c.w. Probably most important is his QTH for QSLing purposes:

Cliff Evans
Pan-American Airways
A.P.O. 605B, P/M
Miami, Florida

AC4's Are Back

I hear through the grapevine that W6GRL is back in pre-war form, knocking them off again, and of all things, working AC4YN again. Doc says it's much more fun working "DX" than pulling teeth, so he is going to concentrate on "DX".

Ken Moore, W6PDB, a "died-in-the-wool" phone man, if there ever was one, grabbed a nice juicy one in working AC3SS, who apparently is in Sikkim. He is e.c.o. and when Ken worked him,

he was on 14330. He is trying to follow an operating schedule and will be on daily from 1030 to 1630 GMT, except Saturdays, and then from 1000 to 2300 GMT. QTH as follows:

AC3SS
Gangtok Sikkim
via Calcutta, India

Other nice ones for 6PDB include XZ2CM, 14140; C5BY, Chunkging, 14220; VS2BA, 14150; VS1BD, 14135; VS1BQ, 14190; SU1KE, 14336; VS1BH, 14220. Ken says the following are still being chased: XA8P, 14326, in Greece, VO6G, 14320; VO6F, 14185; YR5AW, 14346; and OX1AA, 14146.

W6ENV reports ET3Y in Ethiopia is operating in the low end of the band, e.c.o. Also says EZ4X apparently is in the Saar area. Some of the boys wonder if he is ex-HB9CX. Then there are two in the Azores, W1DTS/CT2, 14125, c.w., and W8QEN/CT2 f, 14290.

I guess most of you have noticed the abundance of "C" calls now on the air in China, as well as the old XU calls. I might be wrong but apparently the "C" calls apply to the Chinese hams where the XU calls are seemingly being used by the Americans, mostly Marines.

W1APU of Dover-Foxcroft, Maine, is doing his share of DX, and is all enthused over a rather unusual type of antenna which he had used before the war. W1DPJ also uses this antenna and is very happy with it. Since it is a little difficult to describe, as well as unorthodox, you might get in touch with APU for details.

W6ITA reports SV1EC, 14140 c.w., and when SV1KE is on c.w. it is generally 14085. ITA also worked YS1X, 14,000 c.w.

Old QD had an extremely interesting QSO with our old friend, John Alvarez, CR9AG. John says he can be addressed simply as:

John Alvarez
Government Office
Macao

Speaking of old-timers ZL4AO is batting it off on c.w. on the low end of the 20 meter band. That guy is a tradition, and it's swell to hear him back in there. He mentioned the other night that he had been spending a great deal of time on 10 meter phone, but I told him that was OK, we wouldn't tell anyone about it.

W9BGC on the opening of the band, worked HK3CX, 14040, HK1AB, and OA4AX, as well as XE2AY. BGC says the last one is practically a local, but it helps his moral. We know what he means.

Some of you fellows will remember W6AWA, one of the old San Francisco DX men. He has been with Submarine Signal Company for a number of years, and at present is operating portable K6. Bill at the present is using a single 6V6, with 12 watts input (a far cry from the rock-crusher in the old days). Even so he worked VE8AS in Whitehorse, Alaska, as well as KL7AD on the Alcan Highway. W1QV has been doing quite a lot of c-w operating, although he confesses he does slide down into the phone band every once in awhile, and with the help of his modulators, works a few stations such as LX1SI and PAØJQ. Bob reports working ZD8A, 14090, YR5X, 14096, YU7X, 14083, D4ALS, 14150, and, incidentally, this is George Hart, formerly of ARRL Headquarters; I1LA, 14109; OZ5XY, 14099; SM5WE, 14180; EI6G, 14086; and who says he is looking for West Coast contacts; XSM6UC, 14186, and says he is good "DX" but won't give QTH (the old meany); YI3CE, 14085, and FQ8AL, 14093. Nice going, Bob, keep it up.

Following is a letter from PJ3X located in Curacao:

Dear O. M.,

Referring to your letter dated April 15th I beg to supply you with the following information:

PJ3X started on the third of March 1946 and has been classified as an experimental governmental station, since normal licenses are not granted down here. Curacao seems to be unknown to many hams—the position of the island, which is Dutch, is 12.06 N. and 68.55 W (this is the location of my antenna).

The input is between 100 and 200 watts. Antennas are two dipoles, one horizontal and one vertical. The horizontal one can be turned. The location of the antennas is bad, completely surrounded by hills. The antennas are only 30 feet high.

I started ham radio in 1930 with call PAØDH. Till my departure to the West Indies I was active on 40 and 20 meters c.w.

For the present I'm only active on ten meters. If I knew somebody in the vicinity, I would be glad to experiment on five meters or lower.

Within a couple of months I expect to leave this island so that PJ3X won't have a long life.

J. P. Daudey.

PS.—Many times I was asked what I was doing down here. I can't answer that question, but I'm a army first lieutenant, and communication officer for army and navy.

Our old friend, W8PQQ, has just been heard from. Al has worked ZB1E, G6CU/ZC2, VQ2PL, VQ8A, as well as the usual run of the mill stuff. Now he is looking for AC4YN. Speaking of AC4YN the frequencies which he will probably use are 14160, 14180, and 14220. When he comes through, generally around 7 to 7:30 a. m. Pacific time, he doesn't stay in very long, so hop to it, boys.

According to W2IOP, his friend W2LNP has been working CSZ (Lisbon) on 3895. LNP uses a vertical, going up the side of an apartment house 350 feet high. W2IOP worked a VE.

W6SA is doing his share of DX and about every time he gets on the air he snags himself a new country or two.

[*Continued on page 53*]

The YL's Frequency . . .

by Amelia Black, W1NVP - W20LB

YOURS TRULY and the OM have just returned from a vacation in New England. While in New Hampshire we stopped off for a very pleasant visit with the Evans, Dot—W1FTJ, and Carl—W1BFT, in Bow. They're especially nice people, and we found Dot as lively as her letters. We also met their two cute junior ops, the oldest of which at four is already very interested in the radio room, and is building a "ceiver" out of Fahnstock clips, washers, screws, and nuts. He sits with fones dangling down around his neck, copying endless messages in his "log."

We had no difficulty spotting the house, via their 80 meter antenna mast, which is stuck on the garage. The antennas for 10, 20, 40 and 80, strung up around the yard come into view immediately afterwards. We found Dot on 20 c.w. when we arrived. She's been surprising everyone lately by getting on fone to talk to some of her anti-c-w friends. Dot's been doing pretty well on 10 too, with 32 countries post-war, the last reported being VP6YB, Barbados, West Indies.

The first news of importance concerns the national elections of the YLRL. Lou Lacy, W5IKC, of Bartlesville, Okla., succeeds Mickey Marglin, W9ZTU, as president of the club. Louise Baker, W9JTX, of East St. Louis, Ill., the former secretary, succeeds Lou Lacy as vice-president. Congratulations to both Lou's, and thanks to Mickey for the excellent job she did.

We've neglected to congratulate Letha Dangerfield, W9OUD, who was re-elected SCM of the Midwest Division. Letha's now the only YL to hold this position.

We've been planning for some time to rectify the OM's observation that YLs never work c.w. Compiled here, is a list of some gals who've been heard on 80 c.w. recently. No doubt many of you fellows will recognize some good ops with whom you've had enjoyable QSO's, but didn't realize were YLs. You may expect to hear more and more YLs with the YLRL net once more functioning on 3610 kc, and 20 and 40 active again.

W1KUI, Ellen Hastings, East Hartford, Conn.
W1FTJ, Dot Evans, Concord, N. H.
W1MJE, Alice Morrison, Danvers, Mass.
W1MDV, Louise Bruya, Waltham, Mass.
W1MPP, Eunice Randall, Watertown, Mass.
W1MUW, Norma Moskey, Manchester, N. H.
W2NAZ, Lenore Conn, N. Y. C.
W2NQC, Violet Villar, N. Y. C.
W2MWY, Elenore McGovern, N. Y. C.
W3KGC, Kay Samargia, Uniontown, Penn.
W3FXZ, Mary Le Van, Flourtown, Penn.
W5JAL, Celia Phares, Ft. Smith, Ark.
W7FWR, Mary Ann Tatro, Olympia, Wash.
W7JFB, Miriam Brown, Everett, Wash.
W8SJF, Gladys Nichols, Wapakoneta, Ohio.
W8VYU, Theresa McLaughlin, Greensburg, Penn.
W9JTX, Louise Baker, East St. Louis, Ill.
W9OUD, Letha A. Dangerfield, Joplin, Mo.
KL7AX, Verna St. Louis, Naknek, Alaska.
VE2HI, Ethel Pick, Westmouth, Quebec, Canada.
VE6MP, Maude Phillips, Chancellor, Alberta, Canada.

YL-DX

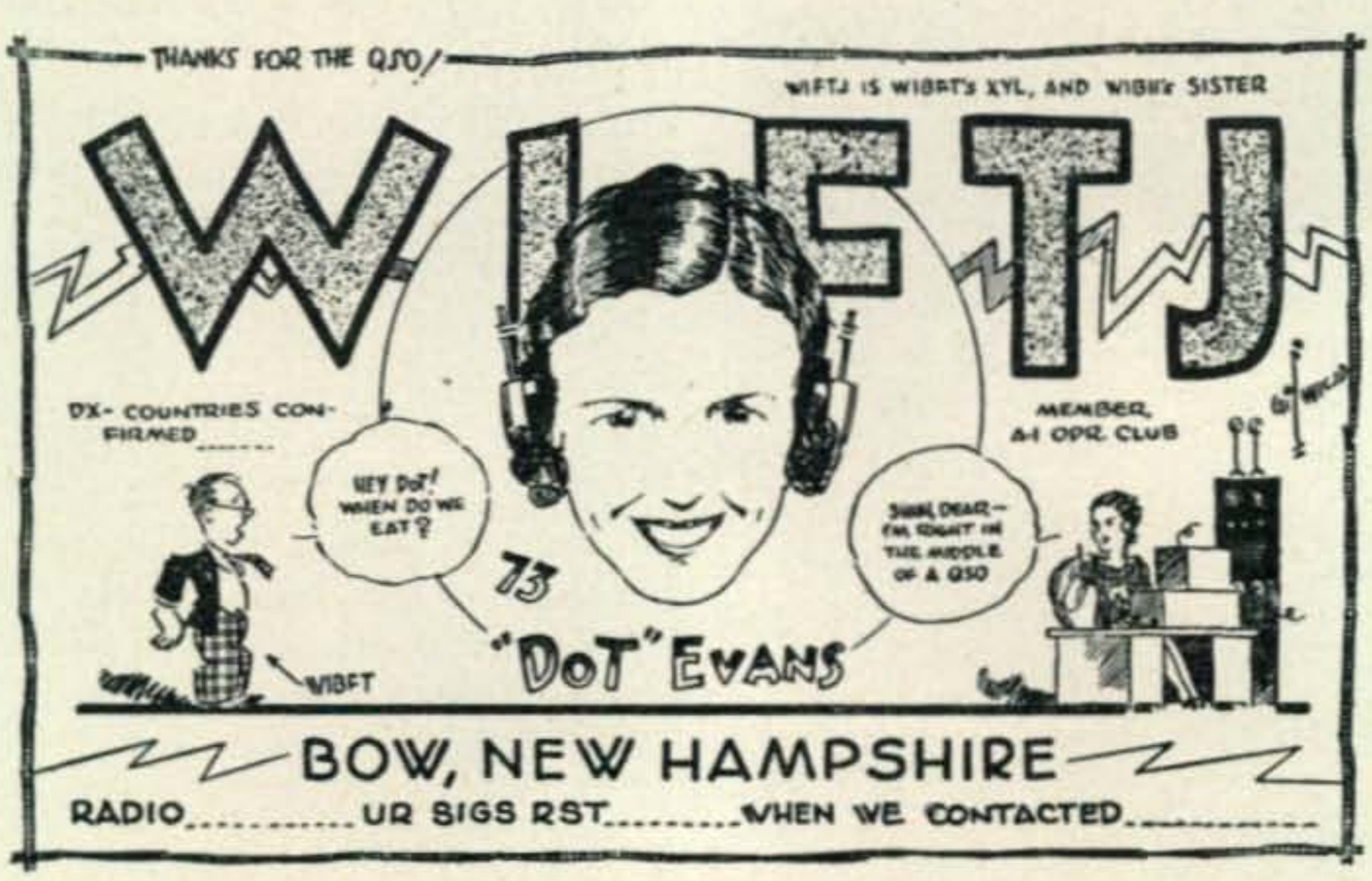
Lenore, W2NAZ, calling CQ on 80, was answered by a loud station that she thought was a local. To her surprise it turned out to be KZ5AD, Canal Zone, Panama—proving that these rock-bottom Manhattan antennas do get out!

A good start toward the Century Club has been made by Lou Littlefield, W1MCW, of Cape Elizabeth, Maine, who reports 50 countries post-war on 10 meter-fone.

Another aspirant is W6UHA, Maxine, who has cards from 30 postwar; last QSO was with D4AGK.

During the past few months many of the girls who took their exams three and four years ago have finally been issued their call letters. Most of the New York City YLs became interested through AWVS work, and belong to the new school of YLs who are trying to get their OMs interested in the hobby instead of the accustomed reverse. Some of the most recent additions are W2PCU—Martha Truman, W2PBI—Jerry Weinberg, W2PMA—Lillian Ruocco, W2PZA—Jean Grabschied, W2QGK—Sophie Lash, W2QJC—Rita Wittman, W2QEJ—Cecil Waters, W2QEJ—Mignon Rosenfeld, W2-

[*Continued on page 50*]


THANKS FOR THE QSO/
W1FTJ IS W1BFT's XYL, AND W1BFT's SISTER
W1FTJ
DX- COUNTRIES CONFIRMED.....
MEMBER A-1 OPR. CLUB
HEY DOT! WHEN DO WE EAT?
73
"DOT" EVANS
SHHH, DEAR— I'M RIGHT IN THE MIDDLE OF A QSO
W1BFT
BOW, NEW HAMPSHIRE
RADIO..... UR SIGS RST..... WHEN WE CONTACTED.....

U H F • • •

by Josephine Conklin, W9SLG*

Bernard Bates, W1BBM, has been hearing a commercial transmitter on 438 mc. He has identified it as WDK. W2PZB has supplied a confirmation and indicates that the transmitter is on Long Island, 178 miles from North Harwich on Cape Cod.

THIS ISSUE OF CQ reaches you at the end of a very nice summer, so far as u-h-f work is concerned. New records have been set up on most bands above 30 megacycles. Six-meter activity has been somewhat low at times, limiting the number of stations that can be heard during an opening, but the band has opened somewhere for two-way contacts nearly every day from the latter part of May until the middle of July, and somewhat less frequently before and after. Low-atmosphere DX continues, and may be enjoyed all Fall, which will be very helpful when the Dec. Sporadic-E layer DX occurs.

On periods of unusually good low-atmosphere bending, or "duct" transmission, two-meter records above three hundred miles have been established, even from home locations. Sixth district stations, including portables like W4TZ/6, have set new records on two meters and above, from hills and mountains in California.

Even microwave work is picking up, and new experimenters will have to get right to work, or the records will be stretched to distances where special locations or conditions will be necessary to break them.

All Districts Worked on 50 Mc!

Cliff Simpson, WØYUQ in Manhattan, Kansas, started to work DX on the six-meter band about June 3, and by the 30th he had raised someone in every one of the ten call areas! Vince Dawson made it at WØZJB on July 14. At last reports, W9ZHB in Illinois lacked only W8, and W1HDQ needed W6 although he had worked a W6 in the new W7 state, Arizona. On July 27, Vince heard eastern stations getting their W7 contacts, including W2BYM for his last call area, and he heard W5JGV/7 get W3 for his last one.

Double-Hop Six-Meter DX

Some of the new records concerned the two-hop work from California and the W7's to the East Coast. Conditions were satisfactory for this type of work—which in the summer requires that two sporadic-E reflecting layers be located at exactly one-quarter and three-quarters of the distance between the two stations, and along the great-circle route between them. There probably was as much of this in June and July as in all previous years put together.

This fortunate circumstance is partly due to relatively favorable conditions for six-meter skip DX, and partly to the use of stable transmitters and narrow-band receivers which improve the "sensitivity"—measured by signal-to-noise ratio. The relative lack of widespread use of the band for local contacts, on the other hand, limit the number of openings that produce two-way contacts, and further limit the stations that can be heard and worked.

Some think that these six-meter openings, though sporadic in respect to reliability and direction or location that can be worked, are also sporadic as to the nature of the two-way contact. That, however, is not necessarily true. There was just as much trouble back in 1933-1936 during the summer openings on ten meters as there is now on six. Howard Zeh, W8JLQ, has sent us a recording containing some of the W6 signals on July 14. Frankly, fellows, it sounds far better than the eighty-meter band because of the absence of heterodynes, and compares favorably with twenty meters because someone is not landing right on top of the station you are working. The signals on the record, two-hop ones at that, are first class.

The first reported two-way two-hop work this summer was between W6OVK in Redwood City, Calif., and W2BYM in Lakehurst, N. J. Then on June 23, W7QAP in Tucson worked W8CLS/1 right after a contact with WØJZB in Missouri who had been coming through for two hours; but, weirdly enough, Bud heard no other signals but these, although many found this to be one of the best days of the summer.

This was followed on June 29, according to WØZJB, by a contact between W1HDQ at Hartford and W5JGV/7—although we received only one other report for that day. Then came the big doings on July 14, for which W8JLQ sent us the recording. Howard found the band open at 7 p. m. Eastern time, hearing W6AOR, W6ANN, W6FMH, W6NAW, W5JGV/7 in Douglas, Arizona, W5WX in Amarillo, and some one-hop signals. W9QCY in Fort Wayne heard W6SMH and W6ANN but he seemed to be right on the edge of the skip and found the fading to be bad, even from the WØ stations at the half-way mark. W7QAP in Tucson worked W8SLU. W8RUE in Pittsburgh worked two W6's. W8OMY/3 in the same city worked seven California stations, finding his receiver packed with W6's between 50 and 51.5 megacycles.

W7QAP again was in on the two-hop work, for the third time, on July 27. Using c.w., he worked the only signal on the band—W1HDQ in Hartford—after a short contact with WØYUQ. Bud thinks that it was the tail end of the opening at 8.10 Mountain time when he fired up, working WØYUQ four minutes later, and Ed Tilton at 8:17. That was all, except for an unidentified m.c.w. carrier on 50.9 mc an hour later. On this day, WØZJB heard eastern stations getting W7 contacts, including W2BYM and W5JGV/7, the latter with a W3.

Six-Meter Skip DX

Last month we summarized reports received up to the date of writing the column before we left for a vacation in the West Indies. Some additional reports have come in since, for the same days, which are of interest. In particular there is one from WØQIN for April 23, the earliest skip-DX opening of the season, when W9DWU, W9DZM and WØQIN worked several east-coast stations. In the following reports for June 11 through 16, data listed last month in this column are not repeated.

June 11th. Minneapolis stations worked W5EHM, W5AJG and W5VV. WØQIN raised only EHM. Orville, W7HEA in Toppenish, Washington, had his

*Conklin Radio Company, 6800 Clarendon Road, Bethesda, 14, Maryland

first opening at 8:25 p. m. Pacific time, lasting two hours, working W7QAP, W6QG, W6LSN, W6FPV and W6AOR, with deep fades on the signals. This latter work may have been on June 13, according to W7QAP's log.

June 12th. W7QAP heard WØYUQ (who reported a contact on the 11th with W7QAP, W5EHM, and W9BDL/5 but our copy of QAP's log showed a dead band on the 11th). W8RUE/3 in Pittsburgh worked W5JKM (that's Mrs. W5AJG) in Dallas. QAP also worked WØZJB for two minutes during bad fading; a few weak and fading signals were coming through at the time on ten meters from Idaho and WØ.

June 13th. Erratic conditions were reported by W7QAP who raised W7DNB and heard W7HEA and W7AVV. The Oregon stations were giving R9 reports to Southern California stations and others, including W6HDY, W6LFN, and W7GBI/6.

June 14th. WØQIN in Minneapolis heard W4??N (probably W4FKN in Atlanta) calling CQ, and was heard by W1LLL and W1HDQ. He also heard W3CGV calling him. The opening was much better in Manhattan, Kansas, where WØYUQ worked W3AXU, W3GOI, W3CGV, W2BYM, W1MUX/3, W2HWX, W3HDJ, W1LLL, W8CLS/1, and W1CGY. W7QAP thought this should have been a good double-hop opening, even hearing the words "W8CLS Portable" on about 50,050 kc, which may have been W8CLS/1 signing, or someone calling him. Bud worked W7AVV, W5FRD, WØZJB, and heard WØYUQ and W5AJG between 4:46 and 9:40 p. m. Mountain time.

June 15th. W8RUE in Pittsburgh worked WØZJB and heard W5FRV in Fort Worth. WØYUQ worked VE3ANY and VE3AVW in Toronto. It was a fairly good opening for WØZJB to the middle-Atlantic states.

June 16th. Using eight watts into a 6V6 transceiver, VE4DG in Winnipeg worked WØZJB. The latter also got W8VIB, W3HDJ and VE3ANY.

June 17th. WØZJB near Kansas City had a brief contact with W6SLO/5 at Corpus Christi.

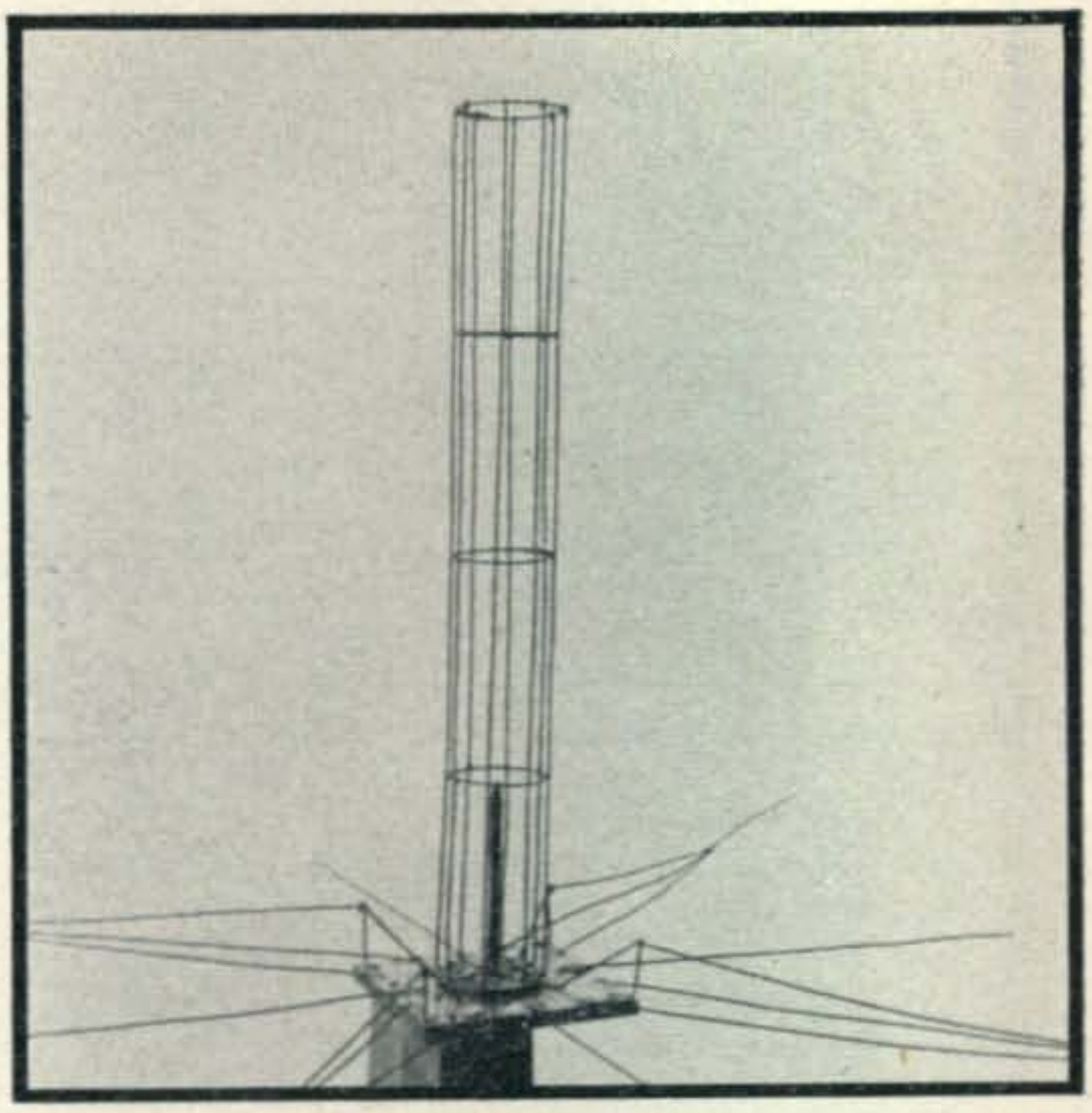
June 19th. While ten-meter short skip was between Atlanta and Mississippi, W4FKN hooked W5VV, whose signal was the only one on the band. WØZJB had a good contact with W5EHM, the former contact being in the morning and the latter in the late afternoon.

June 20th. WØZJB got W9BDL/5 at Corpus Christi at 6:57 p. m. Central time, followed by working W6ANN who called CQ in Spanish, and W7HEA located in Washington. WØYUQ in Kansas hooked W6ANN, W6LSN and W6FMH, all in the Los Angeles area. W7QAP heard a carrier on 50,350 kc at noon, and raised W5EHM, W5AJG and W9BDL/5 in the evening, witnessed by Clyde, W6QLZ.

June 21st. A brief contact was reported between W5EHM and WØZJB in the evening.

June 22nd. Vince Dawson thought that this should have been a good day elsewhere, judging from ten meter skip to all parts of the country. In the late morning, he heard W6ANN talking with a W6 marine mobile. After calling all day, WØZJB got W5JGV/7 at Douglas, Arizona, at 6:25 p. m. Central time, then a contact with VE4DG in Winnipeg.

June 23rd. This was a double-skip DX day as reported in part above. When the band opened at 9:40 in the morning at WØZJB, Vince heard W1's working stations in Illinois and Minnesota, and then he hooked W2JCR/1, W1LLL and W7QAP. Inasmuch as this looked like a set-up for double hops, he broadcast QAP's frequency and the information,



Broad-band two-meter ground-plane vertical antenna at W3GKP, Silver Spring, Md.

which was picked up by W1's. He was rewarded by hearing QAP work W8CLS/1. Vince went on to work W8CLS/1, W1LSN, W1NF, W2FID, W1HXL, W1FJN, W1AEP, VE3AVW (at 12:26 p. m.), W2FC, W2AMJ, W4FKN, W8BOK/8, W3CGV, W2BYM, W3HDJ, W4EDD/3, W1QB/4, W8RNP/3, W1DEI/4, operating mobile, W2EUI, W3HFY, W2BYW, VE3AEU (at 4:41 p. m.), W2GYV. The band then closed long enough for Vince to promise his wife a trip to the movies, then at 8 p. m. he risked divorce to find W1's weak and Washington, D. C. stations R-9, working W1CGY, W9STX/3, W3IUN, W1KMZ/3 and W1MUX/3. Vince heard W1HDQ, W3BES, and W4FBH, working all others heard. WØYUQ was a house guest, claiming a conspiracy to get him away from home on the big day. WØOTV operated WØYUQ's station, hooking W8CLS/1, W8CIR/1 and W1CGY. In Atlanta, W4FKN raised W1CGY, WØZJB, W1LSN, W9PK, W1BB and W8CLS/1. He heard W3HDJ, W2BYM, W4EDD/3 in Washington (for very short skip), W2AMJ, W2PTJ, W9QIN/Ø in Minneapolis, W9SV, WØBJV in Watertown, South Dakota, W1FJN. W8RUE/3 in Pittsburgh worked W9SV in Great Cloud, Minn., W9JHS in Marshall, Minn., and W9DZM in Champlin, Minn. He heard W9TAZ, W9QIQ, W9IFW, W5VV and WØZJB. W7QAP raised WØZJB and had a double-hop contact with W8CLS/1, but missed most of the criss-cross skip in the east. Glenn Harnishfeger, W9QCY, in Fort Wayne, started out at 10:25 a. m. by working W8CLS/1, W8CIR/1, W1DIC, W1AEP, and W1HXL. In the afternoon he heard WØZJB working W1's. In the evening he heard a station in Marshall, Minnesota (W9JHS or W9QIQ?), and miscellaneous signals which were not positively identified. In Minneapolis, the various openings were participated in, the evening one that missed Fort Wayne being the best; W9DWU worked 12, W9IFW got five, W9SV hooked 27, W9DZM contacted 26, W9JHS and W9HXY working some; WØQIN raised W2BYM, W2FC, W2EUY, W2EUI, W3AIR, W3HDJ, W3FXG, W3BYF, W3AC/2, W1KMZ/3, W4CDG, W1DEI/4, W1QB/4, W3GOI and heard W1MUX, W2PTJ, W3CUD, W3BES/3 and W3AC/2.

June 24th. A new state was worked by WØZJB in a contact with W1NWE/4 at Orlando, Florida. VE3AEU was hooked by WØYUQ.

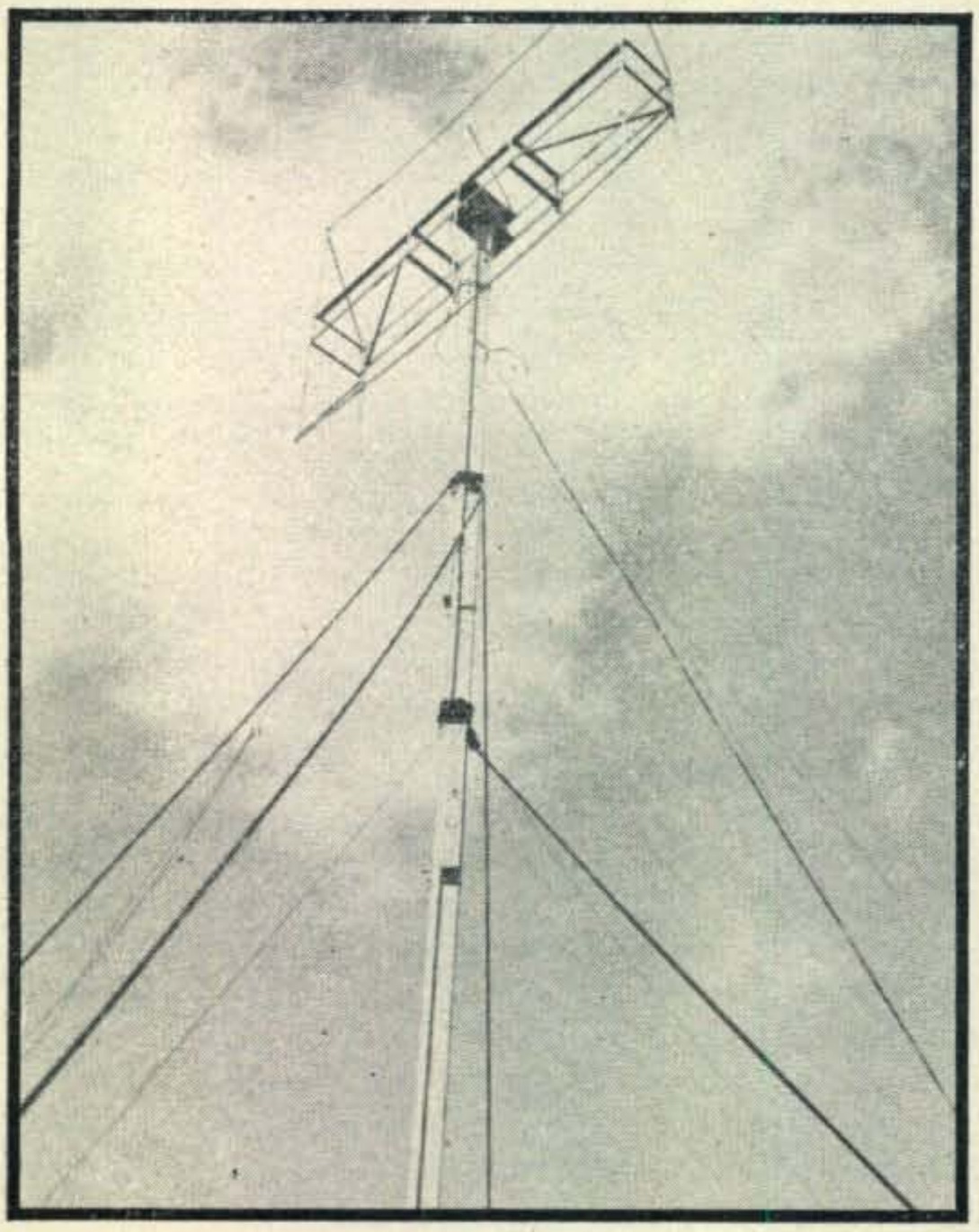
June 25th. WØYUQ contacted W8CLS/1, W6SLO/5 and W5JGV/7. WØZJB found the opening good, in the evening working W1HPV, W1AEP and W8CLS/1 before the band shifted to W5VV in Austin, Texas, then to W5JGV/7 for a contact, and back to W6SLO/5. WØQIN in Minneapolis hooked W1AEP, W1LLL, W1HDQ, and W2BYM.

June 26th. Another afternoon opening at WØQIN produced contacts with W8RUE/3, W1KMZ/3, W2PWP who is ex-W3HDJ listed on other dates above, W9STX/3, W1LLL and W1HDQ.

June 28th. WØZJB heard a weak and fading signal on 50.7 megacycles. WØYUQ hooked W7QAP and W5JGV/7. W7QAP had no other contact.

June 29th. A double-hop contact was reported to us by Vince Dawson between W1HDQ and W5JGV/7, but we have no other comments on this date.

June 30th. W9QCY started this day off early at 8.50 a. m. by working W5AJG, W5DNN, WØYUQ, W1NWE, W6SLO/5, W5FRD, ending at 10.10 p. m. when he heard W9LMX. WØZJB started at the same time, raising W8CLS/1, W5AJG, W5EHM, W3HFY, W8OMY/3, W3BYF, W3OR, W5JGV/7 (looks like double hop is possible here—see June 29th above), W1NWE/4, W2IDZ, W2IQQ, W3CGF, W3FMB, W2BYM, W4AVT, W9WMI/4. Vince heard W7QAP, and a double-hop call from W3OR to W5JGV/7 who exchanged calls. He also heard W3HFY calling W6ANN, who came through for a few minutes. WØYUQ hooked W8OMY/3, W8KQC, W8LZN, W8IFM, W3HFY, W9QCY, W2IDZ/2, W3OR, W1NWE/4 and W2BYM, getting two districts—W9 and W4—needed for the *first station to work all districts on six meters.* W7QAP also got in early to contact WØICV in Topeka, Kansas, WØZJB, W9CHI in Grand Junction, Iowa, W6SLO/5, W5AJG, W6LFN and W6ANN. He heard WØYUQ, WØBJV and W5FRD. At noon, W7HEA in Washington got W6JUM, W6NAW, W6ANN, W6OLO and W9LLM/6 of the Los Angeles gang.



Eight-element antenna with "bed-spring" reflector on two meters at W3GKR.

July 50 Megacycle Skip DX

July 1. Using only a 9002 super-regenerative detector, and having worked only WØZJB, VE4DG in Winnipeg was rewarded for hours of listening when he heard W2BQK in Bergenfield, New Jersey, call WØZJB and work W9MZJ. WØZJB got in on an evening opening, working W1EKT, W1LLL, W8CLS/1, W1HDQ, W2BYM, and W8OMY/3. He also heard W8LZN in Detroit who was busy with South Dakota stations. In Fort Wayne, W9QCY hooked W8CIR/1, W1HXT?, W1KPN?, and W2BYM. Out west, the opening was at noon rather than in the evening; W7QAP found his beam peculiarly unresponsive to directions, working W7HEA in Washington and W7AVV, W7ERA and W7AMX in Portland, Oregon. The latter were very loud, and were also getting California stations. W7HEA started at 10:00 a. m. Pacific time, working W6AQJ, W7QAP, and W6IWS. He heard commercial harmonics like KPH, KFS, KUN and KNG for three hours.

July 3. W7QAP worked W6IWS in Brookdale, and W5JKM who was using a verticle like her husband, W5AJG, was on 28 mc; both of the latter were very good, but QAP's beam had to be turned at right angles!

July 7. In Tucson, W7QAP contacted W7ERA, W7FLQ, W6QUK, W6OLO and W6QG. He heard W6IWS. His beam had to be pointed north-northwest for all contacts, and the W6's are said to have had theirs northeast to make the contacts.

July 9. A card from W5WX on this date, apparently refering to an opening on the 9th, indicates that he worked W6NAW and W6LSN, hearing W6VXF and W7GBI/6.

July 10. W1NWE/4 was raised by WØYUQ at 6.06 p. m. Central time.

July 14. This is a big double-hop day reported earlier. In Allentown, Pennsylvania, W3BYF hooked W9KYF, W9UNS, W9JVE, W4BBR, W4HVV, W1NWE/4, W9UIA, W4HVD, W9NCS and W9MZJ and heard W9QUV, W9IFB, W9YUQ, W9DZM, W9HXY and WØZJB. The latter started at 6.00 o'clock in the evening, raising W4HVV, W9QCY, W8CLS/1, W2AMJ, VE3BFF, VE3AZV, VE3ANY, VE4AP, W8SLU, W2PYW, W2BQK, W8UFN/8, W4BRR. He heard East Coast stations working lots of W6's and W7's but none of the latter came through to Vince, whose greatest trouble was the modulated oscillators used by perhaps a hundred VE's in Toronto and Winnipeg. W8SUL near Toledo worked W8CLS/1. W8JLQ heard W6AOR, W6ANN, W6FMH, W6NAW, W5JGV/7, W5WX, W9NFM, WØZJB, WØYUQ, W5AJG, W7QAP. In Pittsburgh, W8OMY/3 worked seven W6's and W8RUE got two. W7OWX heard W5WX and a two-hop signal, W2BYM. W7QAP raised W6ANN, W6QG, W5EHM, W8SLU, W6FMH and W6QUK in a four-hour opening, and heard W9QCY and W5WX, together with a harmonic of KKR2 on 53 mc who came in for three hours. In Fort Wayne, W9QCY started to hear fading signals for two hours at 4:30 p. m., then worked W4HVD, WØYUQ, WØZJB and heard W4BBR (for several hours) W6SMH and W6ANN, feeling that he was on the edge of the skip because of the fading and shifting from one area to another. The band opened at

[*Continued on page 48*]

parts & products

Variac Autotransformers

A new series of Variac autotransformers, designated as Type V-5, is announced by the General Radio Company. Intended for the manual control of a-c voltage, these new Variacs incorporate many improvements.

Through the use of grain-oriented strip cores, both iron and copper are reduced for the same power rating. This weight saving is furthered by aluminum structural parts instead of steel and zinc. The overall reduction in weight yields 25% more KVA per pound than previous models.

The new General Radio unit brush is used, which can be changed without tools. Proper brush pressure is assured by an accurate coil spring, and brush extension is limited to prevent short-circuit damage through contact of the brush holder with the winding.

Rated output current for 115-volt models is 5 amperes; maximum current is 7.5 amperes. Voltage output can be varied from 0 to 17% above line voltage. Volt-ampere rating is 0.862 KVA. 230-volt models will handle 0.575 KVA with current ratings

of 2 amperes, rated, and 2.5 amperes maximum. Available in several models, with or without case and terminal box cover, the new V-5 Variac is adaptable for bench use in the laboratory or for building into other equipment.

Lightweight Oscilloscope

A new lightweight oscilloscope, the "Pocketscope," which embodies all the functions of the conventional instrument but in extremely compact form, has been released by Waterman Products Company, Inc., of Philadelphia. The "Pocketscope" weighs only five and one-half pounds, is six and three-eighths inches high, three and three-quarters inches wide and 10 inches deep.

The Model S-10-A, features a complete cathode ray tube oscilloscope incorporating the cathode ray tube, vertical and horizontal amplifiers, linear time base oscillator, synchronization means and self-contained power supply.

The new instrument is capable of indicating in two independent dimensions—vertical and horizontal. As used normally, the vertical dimension is amplitude, and the horizontal may be either amplitude or time. However, by means of external signals, any variable can be assigned to independent dimensions.

The "Pocketscope" cathode ray tube is magnetically shielded and the telescoping light shield (1¼ inches) permits observation even in places of high light intensity. The controls and terminals are placed functionally so as to permit easy adjustments without reference to complicated instructions. No re-connections are required for signals passing either through the amplifier or directly to the deflecting plates.

The time base oscillator uses a double triode, tube connected as a multi-vibrator, producing a substantial linear trace from 10 cycles to 50 kc. Synchronization with low voltages is possible in the audio, supersonic and low r-f ranges.

V-H-F Transmitter Kit

A precision-machined shorting bar with multi-fingered silver plated contacts, a coaxial non-inductive plate blocking condenser, a silver plated linear tank circuit, and a micrometric tuning system (135 to 250 mc) employing a finely adjustable lead screw are prefabricated, ready to assemble in the new Hytron HY-Q75, v-h-f transmitter kit.

Using the HY75—for which the kit was especially designed—useful power outputs (plate power output less grid drive, radiation and circuit losses) of 14 watts on c. w. and 11 watts on phone can be obtained.

A pictorial wiring diagram and easy-to-understand

More

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AMERICAN PHENOLIC CORPORATION
is now completing a sizable addition to its Chicago plant. This means a substantial increase of the already great facilities for production of quality parts for communications and electronics . . . components that have built the high reputation enjoyed the world over by products bearing the Amphenol name.

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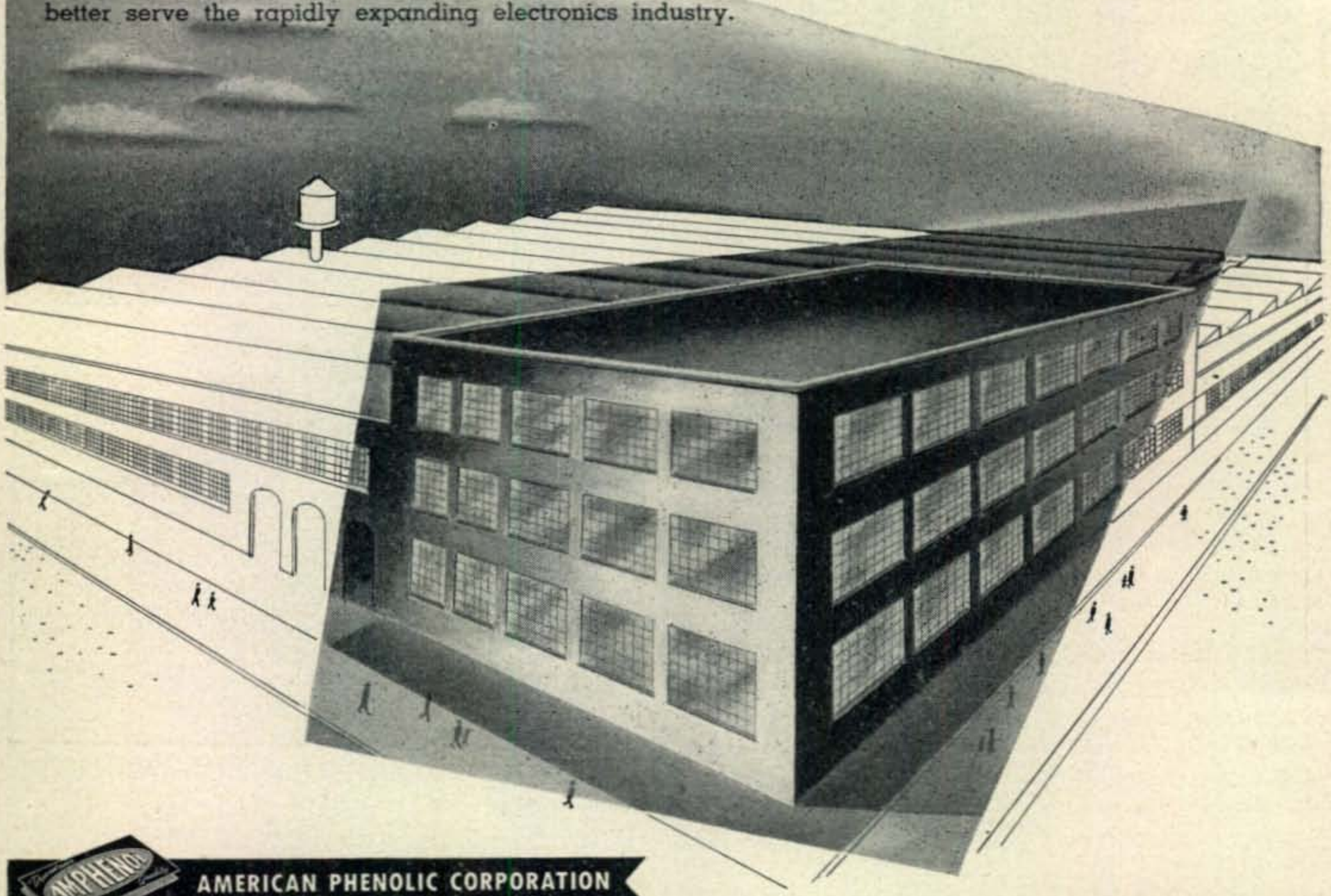

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instruction manual make assembly a one-hour job. A chart permits rapid location of the amateur bands. Quick band changing from 1¼ to 2 meters is possible by adjusting the positions of the shorting bar and coupling loop which matches efficiently either concentric or parallel-line feeders.

The assembled HY-Q 75 is a complete v-h-f, r-f unit—a. c. or d. c., fixed or mobile. Add the HY75 tube, power supply, modulator and microphone, and you are on the air. The kit also makes an excellent laboratory power oscillator for special v-h-f measurements and classroom demonstrations. It is available either in kit form or completely assembled, wired, and tested.

60-Watt All Band Transmitter

A compact single unit transmitter that is simple to perate and at the same time flexible in its application is now being manufactured by John Meck Industries, 35 E. Wacker Drive, Chicago, Ill.

A 6L6G is used as a regenerative oscillator. This drives two 6L6G's operating as push push doublers in the final r-f amplifier. A single 6SN7 connected as a cascaded amplifier drives a 6SN7 phase inverter. Two 6L6G's in push pull, operating Class AB are used as modulators. Any crystal or high impedance

dynamic microphone may be used.

Additional features include built-in antenna changeover relay, provisions for plug-in battery or vibropac operation, meter switching to final amplifier grid or plate circuits for tuning, crystal socket on front panel for rapid frequency change, send-receive switch equipped with extra contacts wired to terminal strip on rear of chassis for receiver standby. The transmitter and power supplies are completely contained in a cabinet 15″ x 11″ x 9″.

Narrow Band FM

Sonar Radio, Brooklyn, N.Y. has released their new narrow band FM unit. Model XE-10 is a small table-top unit which will provide an FM deviation of 2-3 kc. Using this attachment it is possible to convert any phone or c-w rig to narrow band FM by merely inserting the connector in place of the crystal or frequency control equipment. Advantages claimed for amateur FM include elimination of almost all BCI, greater signal-to-noise ratio, high efficiency, and economy over other forms of modulation. Dimensions of the unit are 9⅝″ x 7″ x 5″ overall. Any AM receiver can be used to receive narrow band FM.

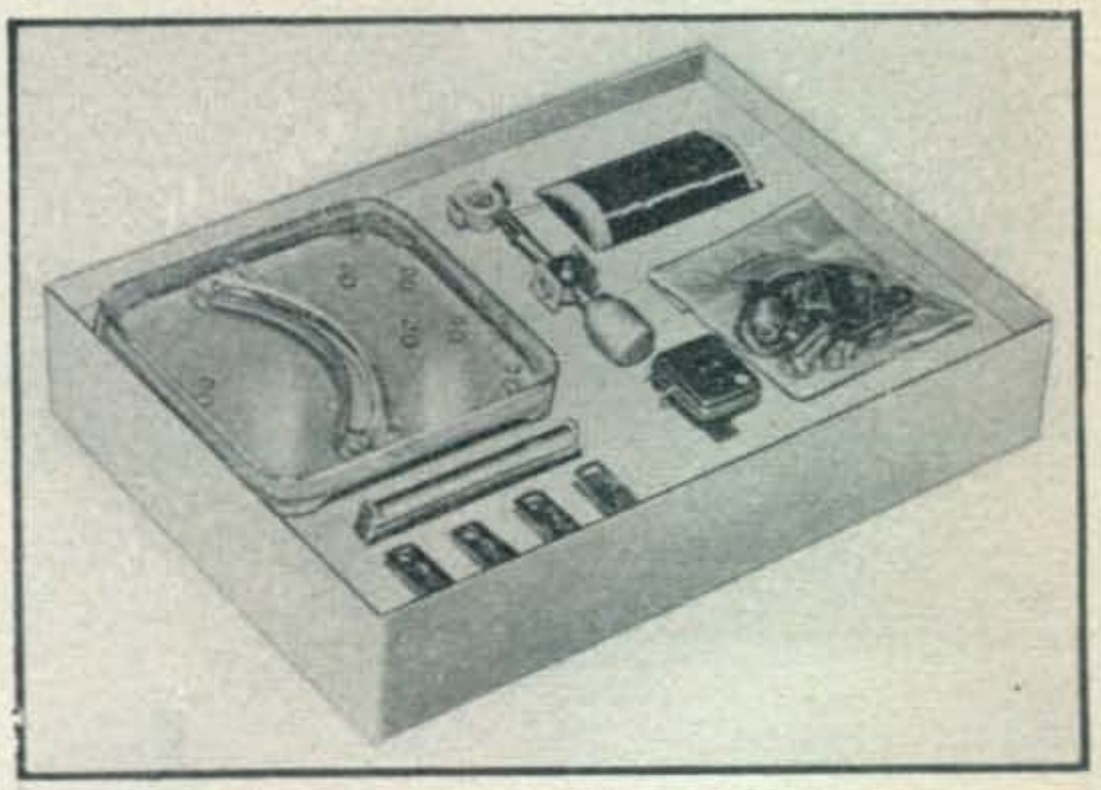
10-11 Meter Converter

Waterproof Electric Company of Burbank, California, announces the "Gon-Set 10–11 Meter, Mobile-Fixed Converter, for use on all standard radios. The actual size is 3½″ x 5½″ x 5½″ and weighs less than 2 lbs. The four tube converter may be used in either an automobile or the home by attaching to the desired radio with a few simple connections. Full

details may be obtained by writing to the manufacturer.

Elementary Crystal Receiver

Kitcraft Inc., 614 N. San Vicente Blvd., Los Angeles 46, California, offers a new radio crystal set kit designed to teach youngsters the principles of radio while they build. The set comes complete with tested galena crystal and mica condenser. Also included is a 20-page illustrated manual containing diagrams, theory and all building and operating instructions. The set is extremely easy to build and works almost anywhere; base and coil form are of "Lucite" plastic. No soldering or batteries are required. Any type of head phone may be used, even



an old telephone receiver. Kitcraft Inc. also manufactures a peanut tube radio kit, a new ring-box crystal set, as well as other radio accessories.

Coaxial Dipole

Engineering Electronics, 50 Fairfield St., Montclair, New Jersey, have released a new coaxial dipole for amateur service. The dipole is supplied with 2 standoff insulators, feed thru bolts, adjustable top

[*Continued on page 63*]

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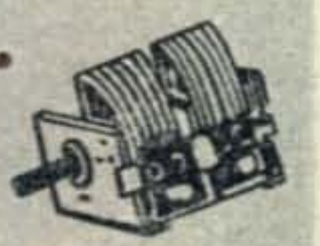

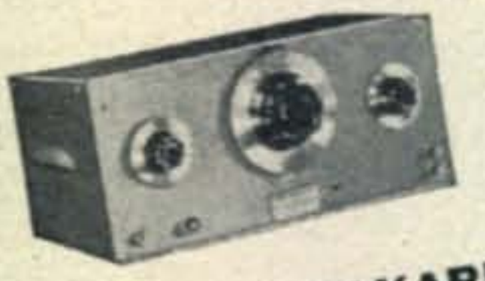

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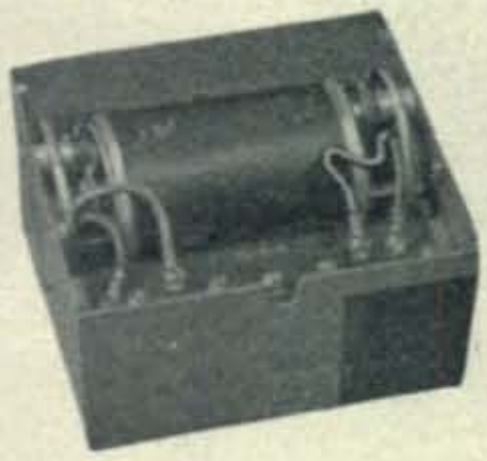

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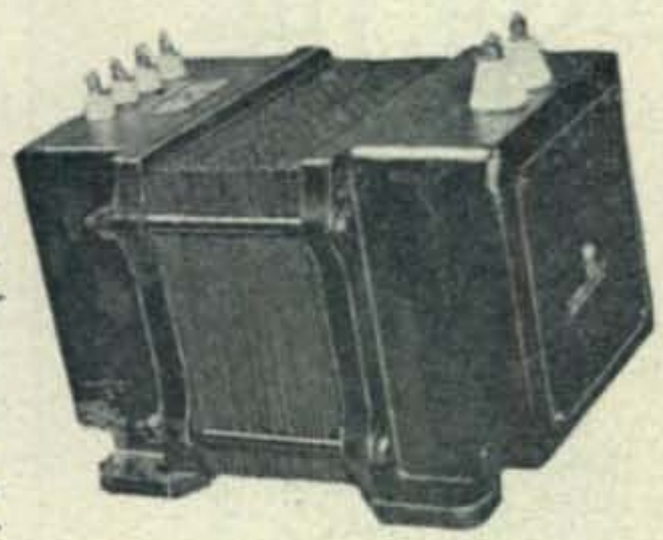

JAN 829B/3E29 TUBE and shielded aluminum socket. Has built-in by-pass condensers. Both for the price of the tube socket.....

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11 Position Switch, 4 deck low loss, bakelite

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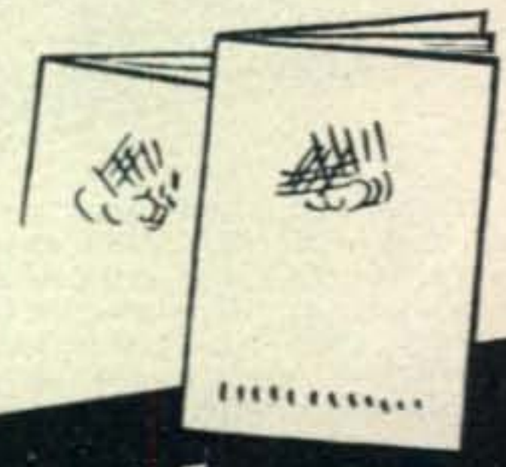

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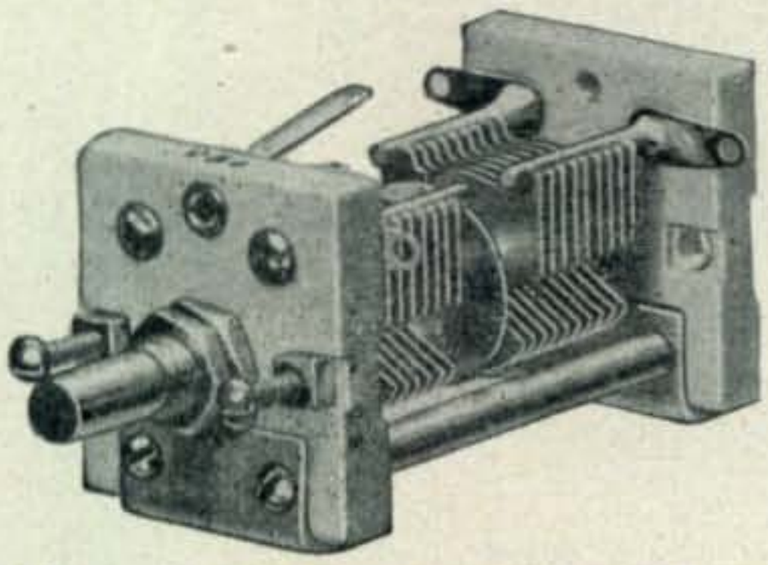
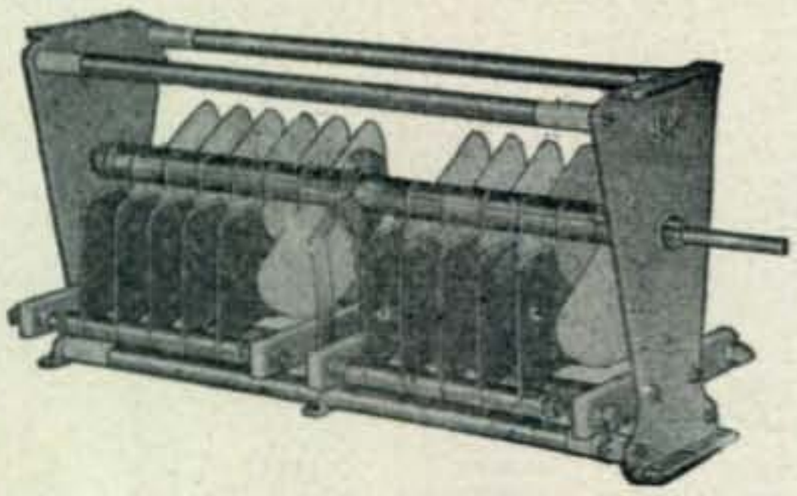


The TINY MITE condensers include a complete line of padders and single and dual section tuning condensers. When space or weight are limiting factors . . . these condensers will "fit the bill."



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Letters

QSLs

2 North Tenth Ave., Mount Vernon, N. Y.

Editor, *CQ:*

After having read your editorial regarding QSL cards in July CQ, I feel that a few words of advice might well be in order regarding QSL cards. In the first place, QSL cards are such an accepted part of the American ham scene that every man who operates on the ham bands should be prepared to QSL when he is requested to do so. Receipt of a QSL card from another ham is an implied request, and should be so honored. This is elementary courtesy.

Most foreign hams are not so plentifully endowed with cash and equipment as the average American amateur. Radio equipment comes by them quite dearly, and they often must pay a tax on their "watts" just as their automobiles are taxed by "horsepower." With two quick strikes against them at the outset, they often cannot afford to QSL every station that they work. While in the Air Transport Command, I met a ham in the Azores. Every station he worked was a DX station and if expected to QSL this would hit him hard—in the pocketbook. The suggested remedy is simple: just purchase an international exchange coupon and enclose it with your QSL in an envelope addressed to the foreign ham. You'll get your elusive DX confirmed this way for certain!

Neil A. Johnson, W2OLU

The Plate Dip

47-25 44th St., Woodside, N. Y.

Editor, *CQ:*

Sam Gendler of Radio-Television Institute, in commenting upon The Plate Dip article which appeared in the June issue of CQ, has pointed out that there is still more to be said regarding this matter. Not only is the r-f component impeded by resonant tank circuit, but the d-c component is likewise diminished as a result of lowered effective plate voltage. This diminished d-c component in turn causes the dip observed on the plate circuit meter.

Furthermore, another factor enters in, due to the out-of-phase relationship between pulses of plate current and negative half-cycles of plate tank voltage, whenever the plate tank is out of resonance. This out-of-phase condition aggravates the plate dissipation requirements, as a certain number of current pulses will flow during the period of maximum plate potential.

The complete analysis is difficult, and numerous factors are at work; but in particular it is well to stress what is happening to the d-c component when tuning through resonance, as this component is read directly on the plate circuit meter.

I believe your readers may be interested in Mr. Gendler's slant, which I am passing along for your consideration.

Robert Middleton, ex-6BTN-6DEL

On Becoming A Ham

560 So. 7th St. Apt. J., San Jose, Calif.

Editor, *CQ:*

This letter is in defense of the "experienced radio man" referred to by Mr. E. Slack Jr., in the June issue letters of CQ.

Mr. Slack speaks first about how hard it is to get

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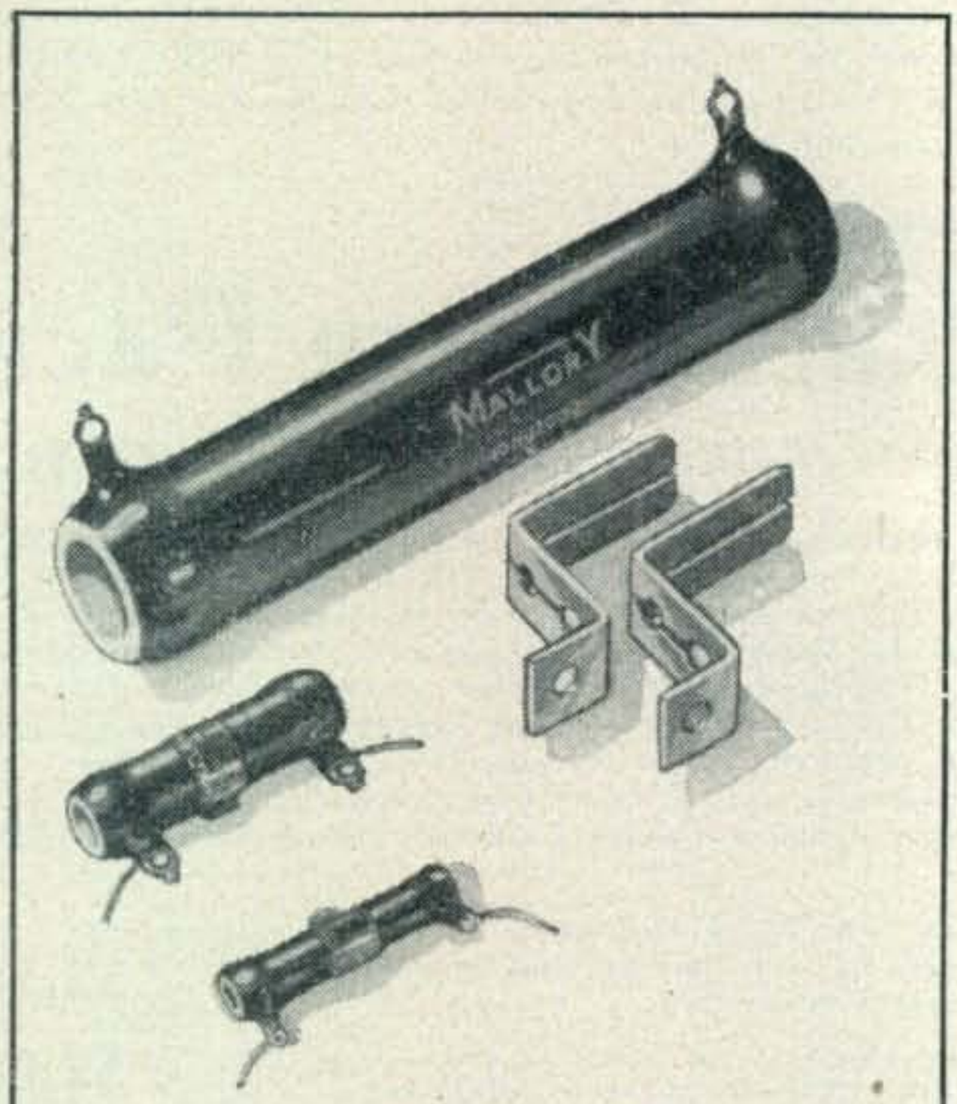

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the old timer to help him build a set and teach him radio. Building the set is nothing. All one has to do is get a kit from a supply house and put it together. As for getting help from the old timer, I didn't have any trouble when I started in 1930, and I think things are the same today.

The letter now comes to the parts situation. We all are having parts troubles. And as for not having enough stores in your town, let CQ help you. Send for the flyers and catalogs of the advertisers. Use the mails when you run into parts troubles. Also it is possible to learn a lot about radio from just reading catalogs as you would read a book.

Mr. Slack, there are a great number of simple one and two tube set diagrams floating around with complete directions. I suggest you see the larger newsstands in your city. Purchase the books you want; do not depend on the public library. If you are really interested in radio, you will want them for reference.

Finally, don't be discouraged with the difficulties of starting into radio as a hobby. If you show the other fellow that you are interested, he will help you. Remember that you can't learn it all overnight. At the best it's a long slow business. No one person knows all about radio; some just know more than others.

Jim Greer Jr.

CQ is pleased to announce a new monthly feature, *The Shack and Workshop Department* to be conducted by A. David Middelton, W1OJH, ex-W2OEN.

This Department will consist of short informative items covering all phases of amateur radio engineering, "gadgeteering" and workshop practice contributed by CQ readers.

Material will be edited, when required, and will be illustrated with diagrams, sketches or photographs.

Ham gadgeteers and workshop experts, here is your opportunity to pass along those ideas of yours and to get a piece of "folding money" for your efforts. CQ will send two crisp new one dollar bills to the contributor of every item published in the S & W Dept.

Send as many items as you wish and be sure to include rough sketches, diagrams or photographs if you have them. Don't worry about the literary form of your contribution. Just get your ideas down on paper—send them in and let the conductor of this Department whip them into shape for publication. Don't forget to put your full name, call, and QTH on each item. The Shack and Workshop Department will be a monthly feature of CQ, so let's have those ideas, brain-storms and dope on your ham gadgets. Plenty of contributions will afford a wider choice and will result in a more interesting department.

The address? S & W Department,
c/o CQ, 342 Madison Ave., N. Y. 17, N. Y.

— • • • —

Horse Traders Shindig

Pre-war v-h-f men will remember the Horse Traders, active in the Northeast and will want to join them on Sunday, September 15th, at 108 West 49th Street, New York City. Reservations for the dinner should be made through Ralph Hasslinger, W2CVF, 25 Franklin Ave., West Englewood, New Jersey.

— • • • —

Crystal Chirps

Inadvertently omitted from "A Compact Oscilloscope," (*August CQ*,) values for resistors R25, R26, and R28 are as follows: R25-10,000 ohms; R26-250,000 ohms; R28-50,000 ohms.

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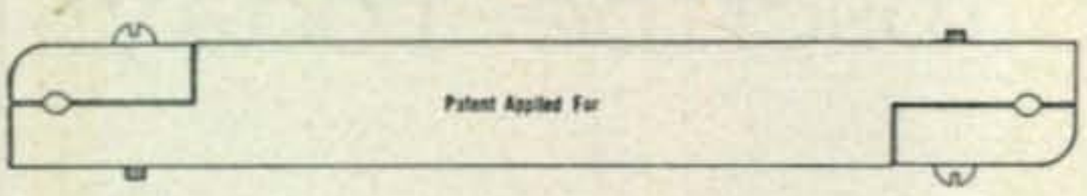

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UHF

(from page 39)

5.30 p. m. Central time for Bert Arnold, W5WX, in Amarillo; W6's first started to come in, followed by W4, W8 and W9. There were many stations on the band, mostly between 50 and 51 megacycles. He worked W6ANN, W6QG, W6FMH, W5JGV/7, W7QAP, W6AOR and W6NAW, not being able to log stations heard.

July 16. On a dead band at 10:10 a. m., WØZJB called CQ and raised W2BYM for a half-hour contact, followed by W1LLL. He heard WKR on 51,475 kc for three hours. In the afternoon, he worked W1HDQ, W1NEW/4, W3CGV, W2PWP, and heard W2BYM at 5:38 when the band went dead for good.

July 17. Vince at WØZJB worked W8CIR/1 and heard W8CLS/1 just before 8 p. m.

July 19. Vince heard only one station thought to be W2AMJ.

July 20. WØZJB heard plenty of fading stations, all the way to the FM band which did not sign. W8CFY swished in. Then he worked W3BYF, W2IDZ and W8CLS/1 starting at 10:30 a. m. after two hours of listening to the unidentified signals. The band reopened in the evening and he hooked W1HDQ, W2BYF, W1LLL, W2BYM, W4HVV, W4CYW, W4WMI/4 and heard several FM stations with no calls used, including one sounding like Forestry Service on 53.9 megacycles, and a harmonic of WKR.

July 21. The ten meter band opened for W4 then W2 and in an hour moved to W8's in Michigan which started the six-meter DX, for WØZJB who then worked W1LLL, W8CLS/1, W1FJN, W1AEP, W1HDQ, W3GOI, W2PWP, W8OMY/3, W3IU, W2AMJ. He also heard VE3AXT.

July 26. With no skip on ten meters, the six-meter band opened up during 100-mile contacts at WØZJB, bringing contacts with W1FJN, W8CIR/1 and then Vince heard W1CGY. Signals had a flutter with beat oscillator on, and high-frequency bands were dead from the effects of the magnetic storm. This may have been aurora-type DX.

July 27. Double-hop signals helped W7QAP who worked WØYUQ and W1HDQ, hearing only one other unidentified signal. WØZJB received good signals from W5JGV/7, and then the band swished east so he could contact W1NDM in Rhode Island, W2JCR, W2BQK, W1KPN, W3FMD, W2EIF, W3FLG, W2AMJ and then W5JGV/7 again. The double hop was giving W7 contacts to the eastern stations.

July 28. WØZJB raised W2BYM, and heard a station calling him a night-owl after ten o'clock in the evening, Central time, on 50.1 megacycles.

July 29. This was one of the best western openings after a slow start with weak signals. WØZJB heard W6ANN worked W7QAP and W5JGV/7. Then he heard a station say Houlton, Oregon (W7ERA). W7QAP had quite an evening, working W7HEA, W6QG, W7ERA, W6FHM, W6OVK, WØYUQ, WØZJB and W6OVK again, hearing VE7VQ?, W6SFL, W6OLO, W6QNU? ending with hearing W7ERA alone contacting California stations, for a four-hour opening. In Redwood City south of San Francisco, W6OVK worked W5JGV/7, W7QAP and W7DNB, also hearing VE7AEZ and WØZJB. The W7DNB reception was a very short hop from Portland, Oregon.

Six-Meter Low-Atmosphere DX

In all of the excitement over skip DX on the 50-megacycle band, it is easy to overlook the local work and the low-atmosphere contacts at distances of 100 miles or more. This is similar to the DX work on the 2-meter band, but definitely should be encouraged so that there will be activity when the DX does skip in.

W8JLQ in Toledo notes that antennas are at a new low, with W9LMX at 18 feet and W9QCY of Fort Wayne, the 96-foot man, down to 35 feet. He says that the reason he doesn't hear the VE3 gang is that they are stubborn about polarization—he no longer conjectures over vertical vs. horizontal, now he knows! After trying a vertical and hearing 95% noise, he found that a horizontal dipole cured the ignition noise to a degree that it does not swamp out everything else. With the W9YKX configuration—twelve elements in the Lazy-H configuration with reflectors and directors, he does some DX work. In an inversion on July 4, he worked W8OAC in Akron and heard W8OMY/3 in Pittsburgh. He also contacts W9QCY in Fort Wayne, and W8SLU at Auburn Heights occasionally.

W9QCY has done some DX work with W9LMX, W9ECH, W8VIB, W9AB, W8JLQ, W8SLU.

WØZJB in Gashland, Missouri, regularly works WØYUQ at Manhattan, Kansas, 110 miles airline. The net also includes WØICV in Topeka and WØJCQ in Fort Riley. YUQ has stacked two of his 3-element beams and now is more consistent with very little fade on bad nights. This net operates nightly on 50.4 mc and is looking for newcomers.

During the skip-DX on June 23, the Minneapolis gang reported hearing W9QIQ in Marshall, Minn., 175 miles west, on some kind of freak skywave or odd groundwave.

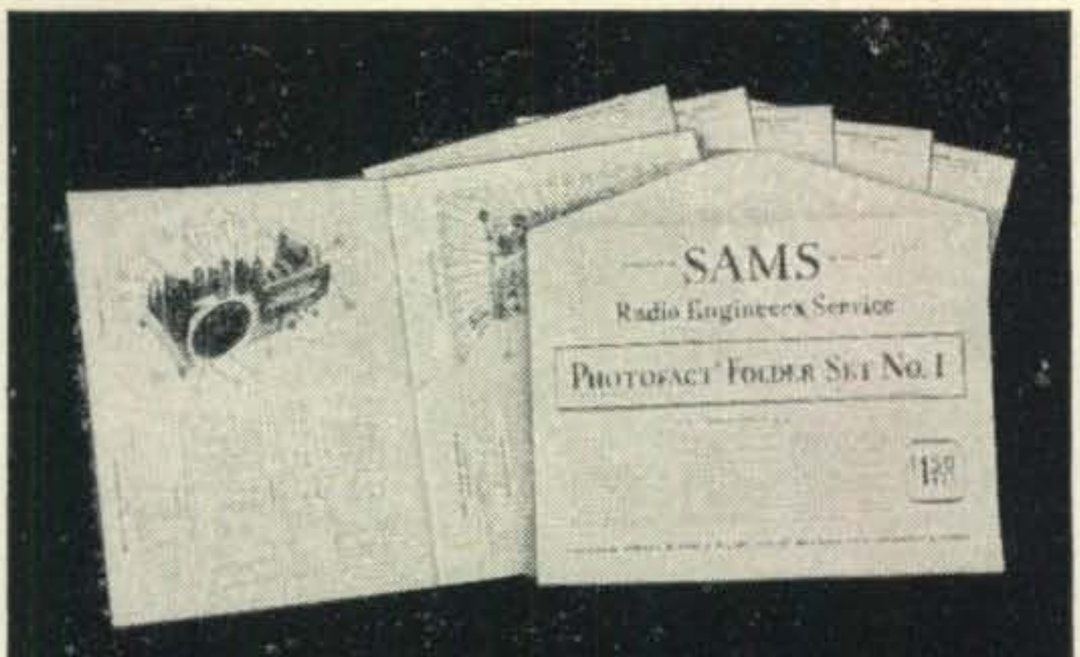
Two-Meter DX

The hopefuls might listen to this one. We received a letter from a former Army Air Forces tower operator who reports that an Army station in Santa Maria, California, using a standard Bendix transmitter (about 50 watts output) from an 829 in the final, as we recall) on about 132 megacycles, worked a station in southern Alberta, Canada, for eight consecutive nights before the circuit was monitored and they were told to stop.

Jim Brannin, W6OVK, reports that on Sunday, July 28th, W6NNS heard W6MEL upwards of 400 miles but no two-way contact was made. W6NNS was on Mt. Diablo in the Bay area, while W6MEL was on Frazier peak near Bakersfield. W6OVK in Redwood City was heard 170 miles away by W6PSQ in Grant's National Park. Jim also worked W6NJJ 149 miles away when NJJ was in Mendecino National Park; considering that Jim's 12-element beam is 18 feet off the ground and at an altitude of 50 feet in a valley, that's good! Jim's other recent contacts include W6BVK in Sacramento, 93 miles without a beam, and W6LSX in Watsonville, 60 miles away.

For a while, Bill Ladley of W6RBQ and Bill Hunter of W4TZ/6 had a bit of a record established on June 9th. RBQ was at Ranger Lookout Station in Grant National Park at an elevation of 7500 feet; W4TZ was at Goat Mountain some ten miles south of Sheet Iron Mountain west of Willows, California, at an elevation of 6500 feet, about 280 miles away. RBQ used fifty watts crystal controlled, and a superheterodyne receiver with a 16-element beam. TZ had twelve watts crystal controlled and a three-element beam. Then along came W3HWN's nice DX of a bit over 300 miles to Rhode Island!

W2JWO who is located at Patchogue on the south shore of Long Island about 55 miles east of New



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York City, has had contacts out to close to 300 miles, and may have held the two-meter DX record. On June 24 he worked three mobile stations in New Jersey, W2NLJ, W2JN and W2NNF. He also hooked W1KPR and W1LPO in Rhode Island. On July 3 he got W1JFF in Rhode Island, W3HOH in New Jersey, W1MNF at over 200 miles at East Orleans, Cape Cod, W3GQS in Feasterville, Penna., W1BJE, W1HCK, W1HJB, W1ME, W1KOE, and W2OCP. On July 5 he contacted W3HWN in Mechanicsburg, Penna., and W2PFQ/8 in Pohopoco, Penna. On July 11 he raised W8CYM/3 at Chester, Penna., W3KME at Tamaqua, Penna., and W1KIM, Winthrop, Mass.

Bill Smith, W3GKP, got on with 30 watts into an 832A last November at Silver Spring, Maryland, just outside of Washington. With a ground-plane vertical, his best DX was W3CRB near Baltimore, 22 miles away. With a horizontal folded dipole in April, he couldn't work anybody, so put up a bedspring-reflector vertical array, making repeated DX contacts including the following: W3CGV in Wilmington, Del., 95 miles; W3LN in Lancaster, Penna., 80 miles; W9GBA/4 mobile on Skyline Drive, Virginia, 79 miles; W4IFW/4 mobile airborne, 30 miles north of Richmond, 60 miles; and heard W3HWN at Mechanicsburg and W2PAU at Mt. Ephriam.

W3KWH, the Steel City Amateur Radio Club in Pittsburgh, is looking for schedules with 144-megacycle DX stations to try out the new 16-element beam, according to W8OMY/3.

Equipment and Activity

Due to the length of the 50-megacycle DX news this month, we are holding until the next issue all of the material on equipment, antennas, activity, and such things as discussion of broad signals on the two-meter band. Please send us the information for future issues, though, and forgive us for holding out.

YL FREQUENCY

[*from page 36*]

QVM—Marion Hart and W2RAQ—Katherine McFadden. W2PMA is very active on 10 fone with 40 watts, which she expects to increase to 150 soon. W2QVM is on 40 meters.

It was Jerry, W2PBI, who was dashed to the hospital in a race with the stork immediately after taking her amateur examination! Seems she was determined to be a legally licensed parent before her baby was born!

Another of these AWVS gals, Louise Willomitzer, now living in California, has just received her call—W6VWR. Lou was a civilian radio operator at the U. S. Army Post on Governor's Island, New York, during the war.

Just received a nice letter from Ruth Brown, W5IZL, one of the "Three Brown Hams" of Electra, Texas, who writes that she's still on 10 only, but expects to be back on 20 and 40 as soon as they can get up some more antennas.

We've been wondering what had happened to Louise, W9JTX; she's been inactive for several months now. Seems that Lou's been quite ill, but we're glad to say is much improved now.

Maude Phillips, VE6MP, is now back on 20 with a new e.c.o. She says it doesn't help much—with every QSO a struggle, and fondly remembers "the good old days in 1939," when she used to sit around and rag-chew for a couple of hours with one contact. Ask Maude, or any of the VE-75 meter fone gang, what the boys gave her as a prize at the Calgary ham-

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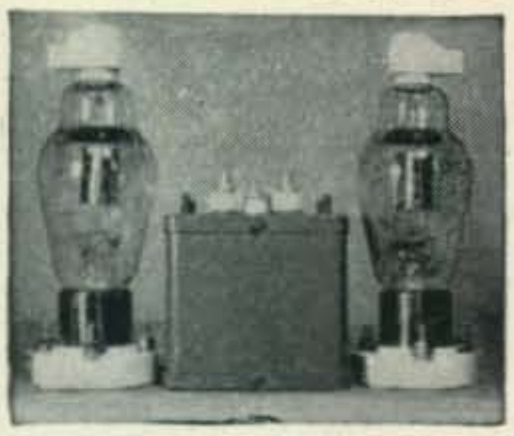

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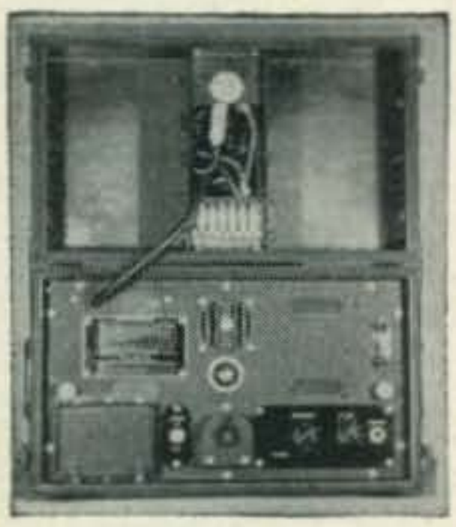

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fest, where she and Dot Fitts, VE6DF, (ex-VE4VO) were the only YLs!

Maxine, W6UHA, says to look for her on the OM's kilowatt rig signing W6TS on 20 c.w. They've been hearing some real DX on 20, and want to try their luck. This past year they have been very busy arranging personal QSO's for families of boys in the service, who remained at the various Pacific outposts, and have also handled traffic for them.

W1MPP, Eunice Randall, of Watertown, Mass., writes that in addition to 80 she's on 2 meters now. Don't let this fairly recent call fool you. Hope we aren't giving anything away, when we say that Eunice is one of the real old-timers and has been on the air for twenty-five years.

In a recent letter from W7HHH, Bea Austin, she writes that she has QSO'd 60 YLs in 33 states and Hawaii, but she's never worked a VE YL. Maybe Bea should put a prize such as a Columbia River salmon that Maude VE6MP, Ethel VE2HI, and Dot VE6DF can vie for!

YL of the Month, Mickey Marglin, W9ZTU

Speed is the keynote of Mickey Marglin's success in radio. Her personality is colorful and vivid. It brings to mind such adjectives as "breezy," "sparkling." Her friends say she not only gets more done than they do, but actually seems to live on a swifter plane than most.

Even her entrance to ham radio was done in a quick and spectacular manner that few can emulate. Her radio experience dates back to 1939, when she was living on the Army Post at Fort Knox, Kentucky. At that time a six month radio course was being given at the Fort. Mickey says, "I made a bet that if it took the boys in school six months to learn radio—to 18 wpm—I would do it in *three* months. The bet was on, and I was on my own! I chuckle now, remembering how I learned the code. I memorized the alphabet by groups of ten letters; I would stand ironing the week's laundry, and with each stroke of the iron, I would say: A equals didah, etc. I practiced on a key and within three weeks I had mastered my 18 wpm. I then applied for and received my ticket. I won my bet, and with it the tremendous satisfaction of knowing that I could do something tough if I tried hard enough."

In May of 1940 Mickey arranged schedules with two cavalry units from Ft. Knox, when they went on maneuvers to Texas and Louisiana. As the men were stationed out in the field, letters to and from their families left behind were a difficult matter. The men operated out of an Army scout car, and by means of Mickey's help they were able to keep in constant touch with their families. In two months of maneuvers she handled almost 2000 messages, making B. P. L. each month.

Her work was so appreciated that the men banded together and brought the matter to the attention of the post commander. He in turn contacted the Signal Corps officer. The final result was that in Jan. of

1941 she was the first woman to be offered an appointment as a civilian radio operator in the Signal Corps.

Her code speed was already 35 wpm, when she accepted the position. Characteristically, she soon attained a speed of 55 words per minute! Mickey remained with the Signal Corps until August, 1943, when she resigned because of the birth of her daughter, Patricia Ann.

Mickey's marriage to Sgt. James Marglin can be added to the list of romances resulting from ham radio, but there the similarity stops. It is true that she met James on the air, but it was definitely not a case of love at first sight, or sound rather. Marglin at that time lived in the barracks at Ft. Knox, one block from Mickey, and operated the rig at W9THS. They both had crystals on the same frequency, and that's where the trouble began. Mickey says, "I didn't know the man, but it seemed that every time I would tune up my rig to do some rag chewing or handle some traffic, W9THS would blare forth with his 450 watts completely blocking my 300 watts. We fought like cats and dogs. I would tell him to sign off, and he'd refuse. The battle kept on for two months. One day I met him by accident. He said, 'You're Mickey—W9ZTU.' I replied, 'You are the dog who has been forcing me off the air daily!' We decided to bury the hatchet, became friendly and later married."

Most of Mickey's ham activities have been on 40, where she was very popular both as an excellent operator and an especially lively person. She's won recognition as a traffic handler as a member of the *AARS* and the Forty Traffic System. She was also a member of the Rag Chewers' Club, and was appointed an Official Relay Station.

Unfortunately at last something has slowed Mickey down. Recently Mickey, Jim, and Patty, started on their way to California, where they intend to make their future home. Enroute they had an automobile accident, in which Mickey alone was injured. She's now at Fort Knox recuperating. But we know that nothing can hold her down for long, and she'll soon be speeding on her way—to give California another W6 YL!

CQ DX

[*from page 35*]

Worked All Zones

In a month or so we are figuring on breaking loose with a list of countries and zones you fellows have worked. We are going to leave the zones at 40, in other words, just the same as always, and as far as the countries are concerned, when you fellows send in the list we are going to follow the same pre-war system of having you give the call letters of at least one station, and the date of the QSO in each country worked. We are going to show a grand total, as well as post-war totals. Obviously, this should please all factions. Some of the boys want post-war totals only, some of them want all time totals, so we couldn't see anything wrong with showing both totals. Naturally, the question will arise as to what is a country and what is not a country. Whatever is decided, it will be equal for all concerned.

[*Please turn page*]

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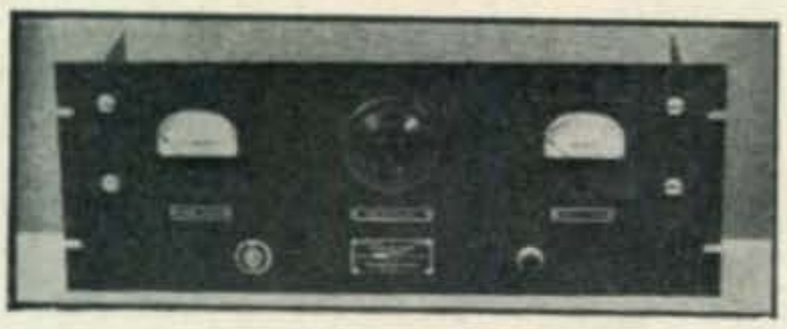

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Now that the bands have been open long enough for you boys to knock over some of this good DX, why don't you take time out and drop us a line on anything you might feel would be of interest to the readers of this column. Surely there are some interesting incidents that happen in your "DX"ing and if, in your opinion, they would be interesting to someone else, drop us a line. Then, too, don't overlook the fact that we are always anxious to get photographs of DX stations, because these are always interesting to the other guy. We will be sure and return the pictures to you. Let's see if we can't get some DX station photos in the next issue or so. I would like very much to see some good healthy contributions from all districts, yes, and they include Canada. How about it, you VE's? We are gradually getting known outside of the country and I am sure some of our DX gang from overseas will soon get in the swing of contributing their bit.

When you haven't anything better to do why don't you round up a few fellows and get what seems to be the prevailing argument going, on what length you should cut the radiator of a folded dipole, using this 300 ohm twin lead. Opinions out here are a dime a dozen and when a person proves his calculations are correct, he'll have someone pop up and disprove it just as convincingly.

That seems to be all gossip this month, but I feel a little disappointed on the DX reported from the W9's. Guess I will have to get my W9 beam in action, in order to see what's going on. See you next month.

DX PREDICTIONS

[from page 29]

10-13-20 and 40 are apparently all open. Ten meters, however, is closing down at this time and although it is very possible that signals are breaking through, they will be either weak or fading up and down so much as to be nearly unreadable. This condition is denoted by the solid white transition area bounded by the MUF and OWF outlines. On 13 meters at 2000 hours PST conditions might be somewhat better, but within one half hour or so, 13 meters would also be ready to close for the day. On 20 meters the band will open for several more hours, or at least till 2300 hours PST. Since the OWF outline does not recross the 20-meter band until 2230, we have a good chance of working Sydney on this frequency.

Of course, the graphs will only indicate the average conditions for one month. Very severe ionosphere storms would disrupt any likelihood of our working DX over certain paths as would the fact that a varying amount of radio signal

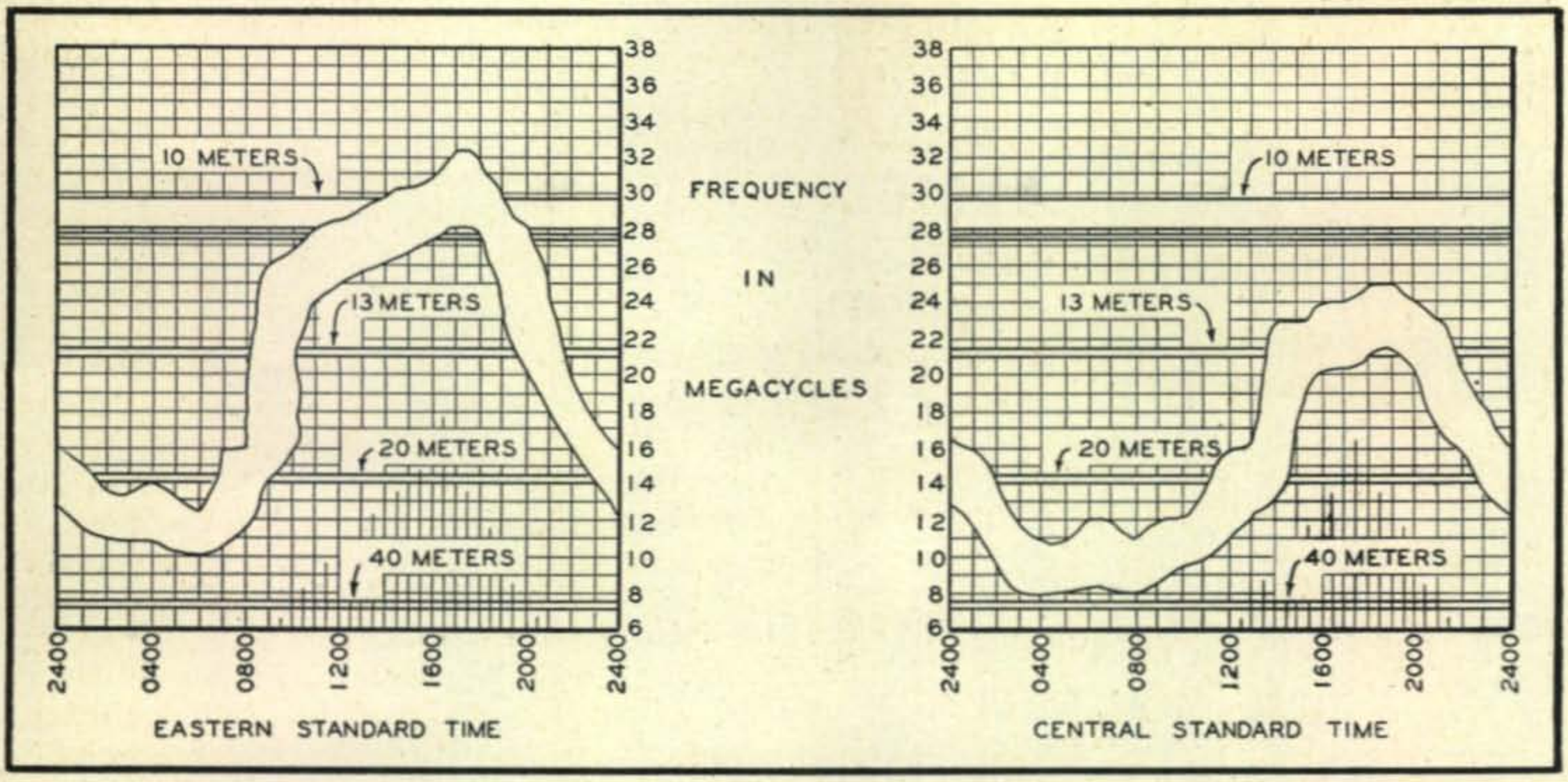

Fig. 2. (left) MUF and OWF East coast to West coast of United States, September 1946 average. Fig. 4. (right) MUF and OWF Central United States to Japan, September 1946 average.

absorption occurs daily and might completely wipe out our signals before they have traveled half the distance. Ionospheric absorption is much more difficult to predict than the MUF. Absorption not only depends upon certain types of solar radiation and their intensity in the atmosphere, but upon the antenna and power radiated by the transmitting station. Generally, the maximum absorption throughout the radio spectrum occurs directly below the sub-solar point, i.e., when the longitude of the center of the great circle path is directly under the suns' rays. Absorption varies so widely from day to day, that in the accompanying graphs only the very minimum is plotted.

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This is represented by a slight shading from the base line during the MUF and OWF peaks.

DX Conditions

September affords a pleasant change from the ionospheric storm beset summer months. As the sun moves southward to cross the equator, DX conditions will be noticeably better from day to day. The band to watch in the latter part of the month will be of course, 10 meters. Around the second week of September trans-continental openings from W1-W2-W3 and W4 to W5-W6-W7 and W9 will start in the mid-afternoon hours. As the month progresses we may expect to find this path open daily till about 1800 hours EST (*Fig. 2*). Possibly around the second week the south and central Africans will break through into the East coast and as far West as the Mississippi River. A little after the middle of the month the first Europeans will be heard on 10 (*Fig. 3*). For the most part they are not expected to be any too strong or consistent, but will show a definite daily improvement as we enter October.

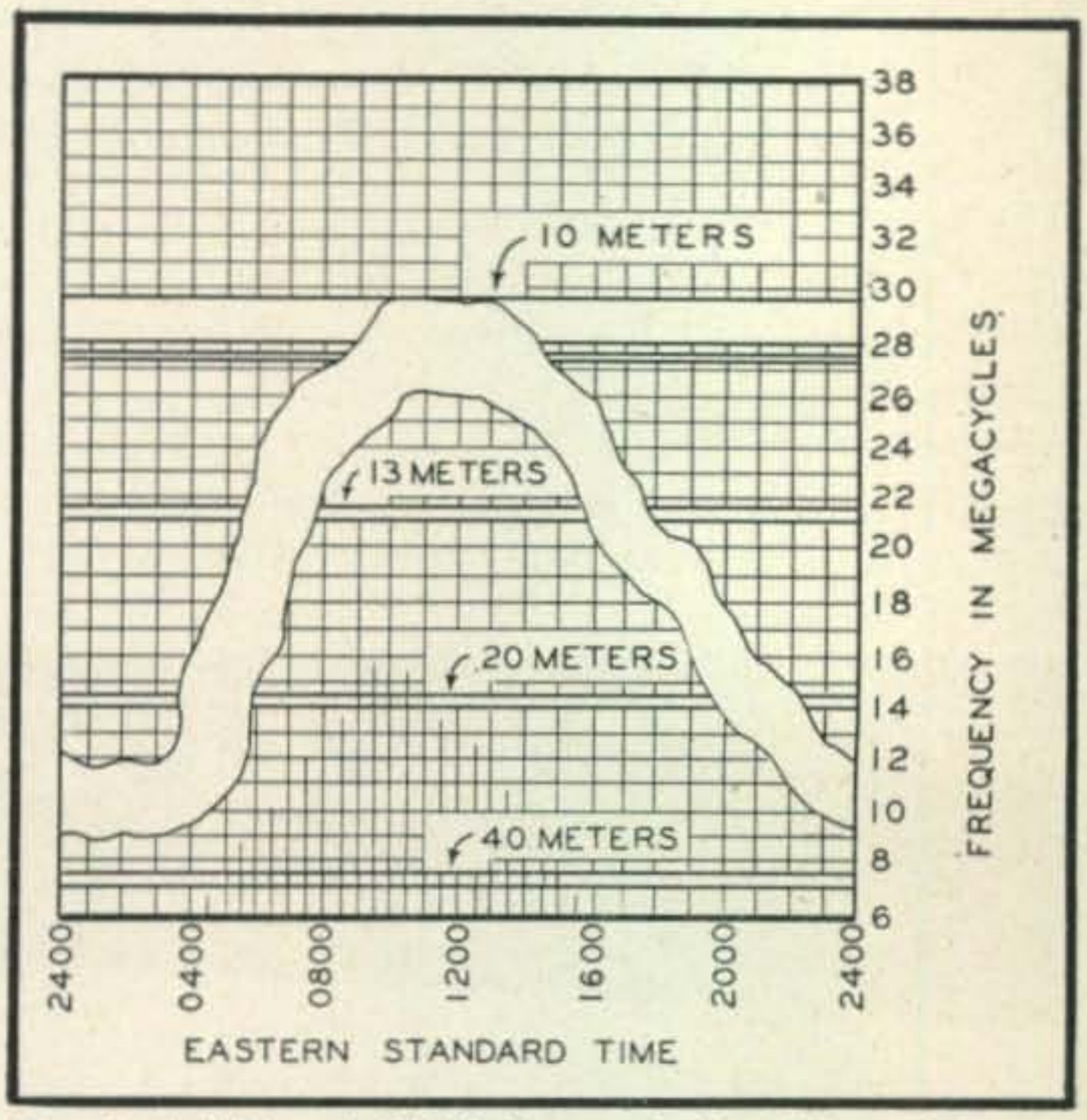


Fig. 3. MUF and OWF Eastern half of United States to Europe. September 1946 average

South and Central Americans will still be good and as the atmospheric noise centers move southward with the sun, 20 meters will stay open longer with many signals picking up strength after the equinox. The improvement in number and strength of the Europeans on 20 meters will be particularly noticeable. Trans-Pacific DX appears to be slowly coming back. In *Fig. 4* we have illustrated the basic conditions from Chicago to Toyko, Japan. Generally this applies to W1, W2, W3, W8, WØ as well as W9. Due to this path passing near the auroral polar regions it is difficult at present to predict the best hours of transmission. Undoubtedly the use of the 13-

meter band would greatly simplify this matter. But, to work the Asiatics listen on 20 after 2000 hours CST.

The amateur band predictions are based upon the research work now going on at the Central Radio Propagation Laboratory of the National Bureau of Standards. Comments and inquiries from the users of the predictions are invited and are of interest to the CRPL and CQ. Address, Propagation Editor, CQ Magazine, 342 Madison Ave., New York 17, N. Y.

75 WATTS

[*from page 24*]

stability, precision-made capacitors are used for the frequency determining element and the entire group of electrical components are mounted within a cast aluminum box. An interior shield isolates the 6AC7 plate circuit from the v-f-o tuned circuit. Zero temperature coefficient silver mica condensers are used as shunt capacitors. A 50$\mu\mu$f main tuning capacitor covers the fundamental frequency range of 3.5 to 4 mc and the geared vernier dial permits accurate adjustment and resetting to desired frequency.

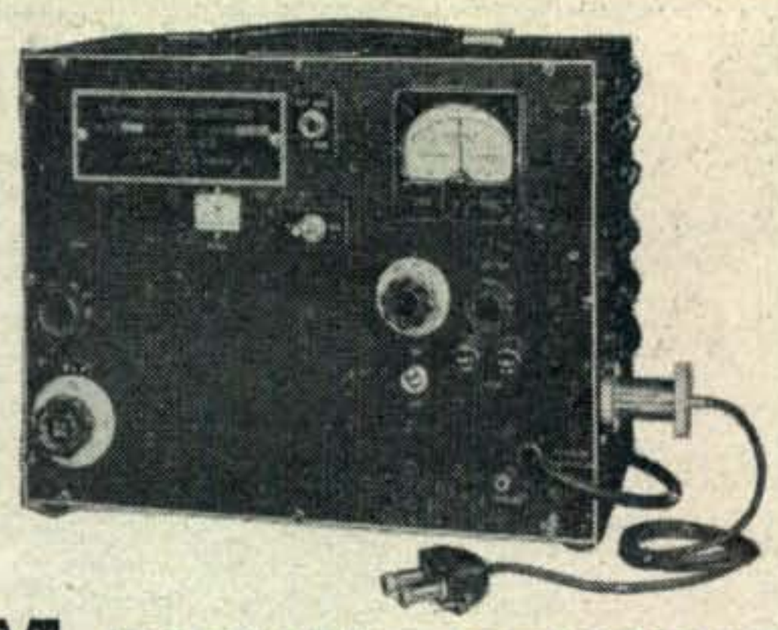
When crystal control operation is desirable, provision is incorporated to permit the 6AC7 buffer to operate as the crystal-controlled oscillator without need of tuning. Changing from v.f.o. to crystal control is accomplished from the front of panel by means of a three-position switch. Provisions are incorporated within the transmitter to accommodate two crystal holders. When the transmitter is operated on crystal control, it is only necessary to resonate the power amplifier tuning condenser and adjust the antenna link to the point at which the proper plate current is drawn from this stage. In other words when using crystal the Temco 75GA is a single dial transmitter.

Method of Keying

When c-w operation is desired, break-in keying of the v.f.o. and buffer stage is accomplished by the grid block method, thus insuring distinctive, clear-cut, clickless keying. Inasmuch as it is unnecessary to tune any of the buffer or doubler stages, no metering in them is required. The transmitter is equipped with 3 plate current meters, measuring final amplifier grid and plate current and modulator plate current.

Speech Amplifier and Modulator Section

The speech amplifier uses a type 6SJ7 tube, resistance coupled to a 6J5 tube; the latter drives 4-6L6 tubes connected in push-pull parallel, which serve as the modulator. These modulator tubes operate as a Class AB amplifier, going into



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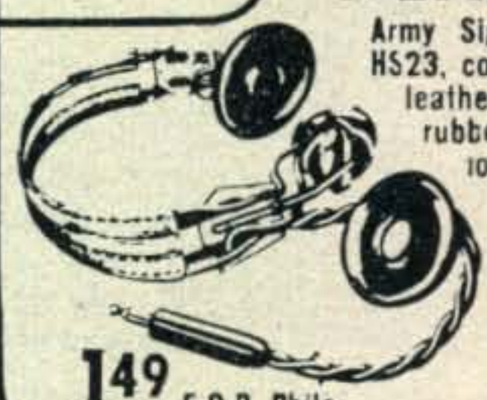

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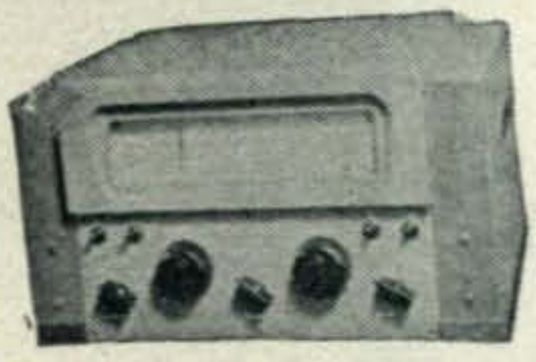
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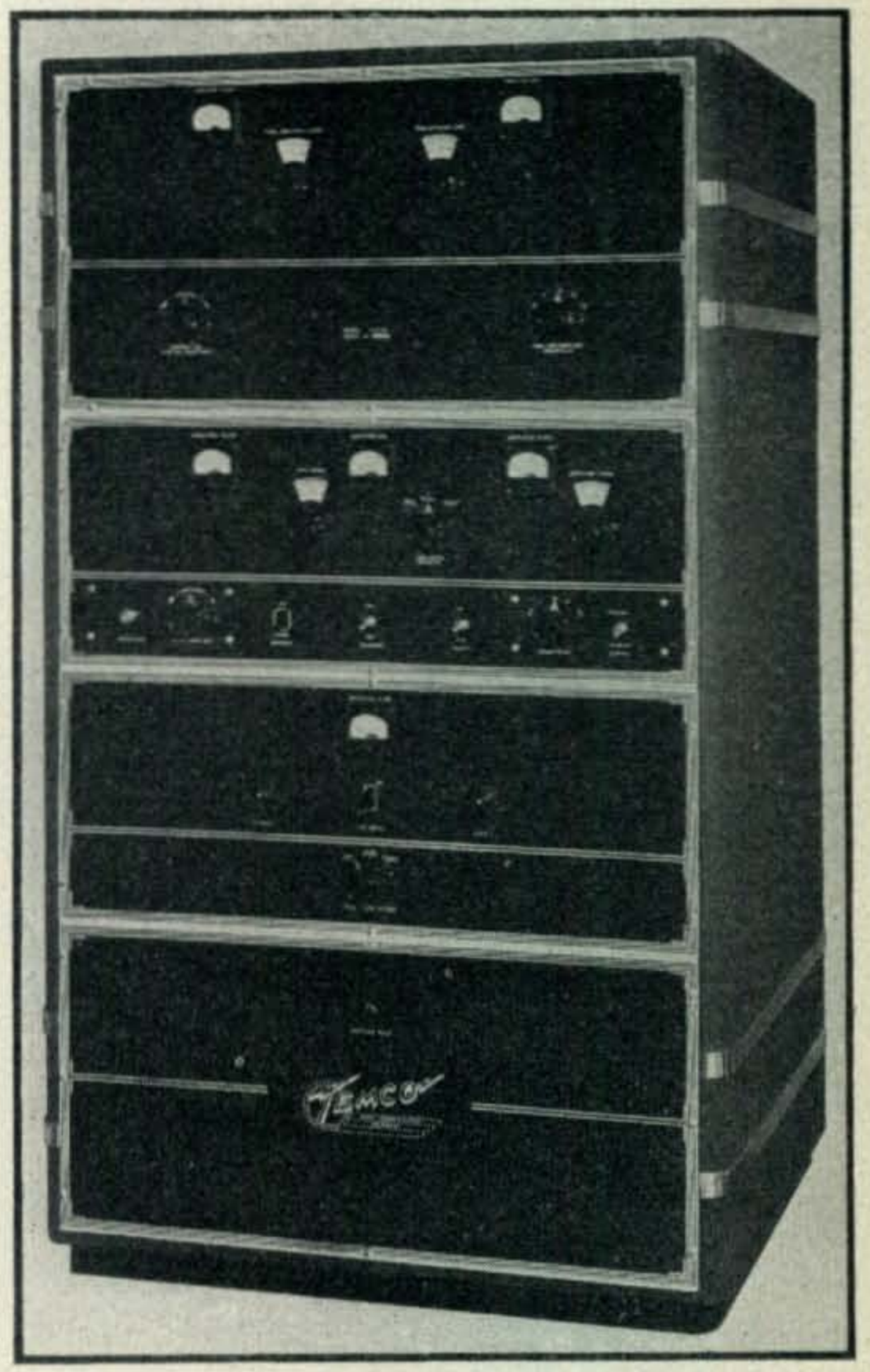
class AB_2 on modulation peaks. The speech amplifier input is designed to use a high impedance crystal or dynamic microphone.

Power Supply Section

Three separate power supplies are provided; the first furnishes plate power to the exciter stages as well as filaments to all tubes. The



By adding units of similar physical dimensions, this 500 watt Temco transmitter is built from the basic 75-GA. It is a feature that hams with limited room or budgets could well duplicate.

second furnishes plate power to the speech amplifier and modulator separately and filament current to the associated tubes. The third supply furnishes power to the final amplifier only.

Mechanical Design

As might be expected, because of excellent design and manufacturing facilities, the 75-GA is mechanically a thing of beauty. Provisions are incorporated for the transfer of antenna from transmitter to a receiver by means of an electrically operated relay, built into the transmitter cabinet. The equipment is designed to meet all the requirements of continuous commercial service and conforms in its entirety, to the Standard of Good Engineering Practice.

WATT SQUEEZER

[*from page 16*]

with no antenna load. During adjustment, the cathode current should measure approximately 100 ma when *C-2* is tuned away from resonance, and it will drop to 35 or 40 ma when resonance is reached. If both the oscillator and the amplifier appear to be working satisfactorily at this point, the applicable antenna circuits may be connected. In every case, the antenna coupling circuits should be adjusted for maximum 807 cathode current, after which *C-2* is immediately readjusted for minimum cathode current. When the amplifier cathode current reaches 100 ma when *C-2* is at resonance, the 807 is operating at its maximum current rating, and for long life this value should not be exceeded. Depending upon the plate voltage to the 807, it is possible to realize up to 75 watts input to the amplifier without exceeding tube ratings.

It has been mentioned that a d-c voltmeter is extremely handy to check that the plate voltage of the 807 does not exceed 750 volts and that the screen voltage with the key down is within the range of 250 to 300 volts. With the key up, this 807 screen voltage should drop to 20 volts.

Sometime during the initial tuning up, it is advisable to insert a milliammeter in series with *R-5*, the grid leak resistance of the 807, to measure the amplifier grid current with the oscillator operative and the 807 plate voltage off. A maximum value of 5 ma is allowable, however, under normal operating conditions the value will be set at approximately 3 ma by the specified values of *C-5* and the grid resistance, *R-5*.

Coil values have been specified for the eighty-meter c-w band only. With other bands available, *L-1* and *L-2* can be removed to make way for coils which tune to resonance at the desired frequency. Those who feel that band changing is somewhat difficult and uneconomical (from a crystal standpoint) can press the 807 into service as a frequency doubler; however, the author is limited to single-band operation for the present and no inconvenience has resulted from the decision to simplify construction details by narrowing the rig down to the barest essentials needed to obtain efficient operation.

Of course, in most ham work, everyone is anxious to improve upon the other fellow's equipment by adding here and removing there to produce the answer to a particular transmitter problem. In poor locations where power is a limitation, the Watt Squeezer will perform exceedingly well, and others in a similar situation might draw several ideas from the rig as described. Fortunately, the rig can be easily duplicated and watt

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for watt, the Watt Squeezer I, gets a lot out for a little, which is something these days.

Appendix

There are two simple methods of metering the Watt Squeezer I. A choice must first be made as to whether or not both stages will be keyed simultaneously. Both stages are keyed simultaneously when the solid connections on the schematic diagram are followed, omitting the dotted jumper between points x_5 and x_6. In this connection, a SPDT switch may be used to shunt a single 0-150 ma milliammeter across either *R-4* or *R-8*, the 20-ohm meter shunts. Since both cathode circuits are closed only when keying, the 807 plate current limiting tube, the 6A3, is in reality not absolutely necessary as a part of the circuit. However, in the event that while the key is down the oscillator suddenly becomes inoperative due to a fault of some kind, the 6A3 circuit will insure that the 807 is fully protected from overload. To make the most of the novel 6A3 system, one can omit the connection between points x_3 and x_4 substituting a jumper from x_4 to x_5 which results in oscillator keying only. This arrangement necessitates the use of a two circuit two position rotary switch to accomplish single milliammeter metering of both stages. In this latter case the meter is connected between x_1 and x_3 when reading oscillator cathode current and between x_2 and x_5 (or ground) when reading final cathode current.

An additional factor governing the above choice is that almost the full 807 plate voltage appears across the key (in the up position) when both stages are keyed together whereas only the 6V6 plate voltage is at the key with jumper x_4 to x_5 in the circuit and x_3 to x_4 open.

BI-SQUARE BEAM

[*from page 11*]

fed with a 3/16 wave stub. This gave a bi-directional pattern quite similar to the W8JK 2-section flat top, with somewhat more gain, but was very hard to feed and quite critical as to frequency and weather. So our next thought was--why not use the added element as a reflector? After numerous tests we have found it to be the answer to a real antenna for 28 mc and low power!

The parasitic element is shown in *Fig. 2* and is an exact duplicate of the radiator in *Fig. 1* except that the stub is longer.

This is mounted on the same pole as the driven radiator and in back of same, the two squares being separated 4'6" (1/8 wave) by wood spreaders which support the wires. There is no

connection between the two. Using a field strength meter located about 1000 feet from the array, the shorting bar on the stub attached to the parasitic element, was run up and down until the point of greatest gain was located, the power input to the driven radiator being held at a constant value after each change.

In our case using the parasitic element as a reflector the proper stub length was 9′3″ but this is not critical to about 2″ either way.

We then moved the field strength meter to the other side of the array at the same distance from it. Leaving a permanent short on the parasitic stub, (at 9′3″ down) we started temporarily shortening this stub until a point was located that gave maximum gain in this direction from the array. This was 7′10″ from the point at which the stub attached to the parasitic radiators. We were then all set, with a real gain. Uni-directional, North or South, depending on where we short the stub on the parasitic element. There is a change in loading when going from reflector to director but this is no doubt due to changed impedance. However, it worked so well we have been too busy on the band to correct this condition.

The complete array is more critical as to frequency than the single Bi-Square but does a very good job over a wide band of frequencies as shown by *Fig. 3*. These reports are by meter on an SX28A at a distance of 24 miles at 90 watts input here to the final.

Results

Since using this complete array we have many times been accused by South Americans of using 900 and not 90 watts. We have been able to work *every* station heard from South America and all except one Asian. This antenna is broadside North and South and is used only for South America and Asia.

We use a single Bi-Square broadside E & W for Australia, New Zealand and Africa and even though the "Zedders" are about 35° off the center of beam, reports have averaged S7. In North Africa the reports are just as good as those obtained with a 3-element close-spaced rotary aimed right on Algeria and that point too is about 30° off the center of the Bi-Square beam.

All in all, for the time, money and effort involved these two antennas have given us more and better DX than any others tried here in over 26 years as an amateur and we have tried them all except the rhombic. We have noticed our reports with 90 watts are usually as good and many times better than those obtained from DX by the 1 kw boys. Sure it's just the location—maybe. We think it is a couple of darned good antennas, which helped by the 3-element rotary, have worked 77 countries since November 1945.

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GROUND plane antenna? See advertisement page 63. Von's Specialty Shop.

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[*from page 42*]

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